# SUPPLEMENT.

# The Mining Journal,

## RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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### L SINKING AND EARTH BORING APPARATUS.

r on this subject, read before the Manchester Literary and Phi- ociety by Mr. David Chadwick, Assoc. Inst. C. E., of Salford, an istory of wells and well sinking, commencing with the earliest ecords, continuing down to the present time, was given. After those wells mentioned in the Bible, the author describes the nployed by the engineers of ancient Rome to discover the most pots for prosecuting operations to obtain water, and the means ed to for testing its purity. For 440 years after the founda- ir city, the Romans were content to use the water drawn from or from wells and springs, many of the latter being supposed r the protection of the deity. It is recorded that every house d its fountain, and water laid on for the use of its inhabitants; not considered that a dwelling was fit to receive a tenant, how- e, unless it was provided with an abundant supply of water. of Alexandria, in Egypt, 320 years before Christ, it is also said private dwelling had its reservoir of water provided for it, and e cement with which the conduits were lined remains perfect ent day.

t known application of a mechanical contrivance for raising wells was the screw invented by Archimedes, who was slain e, about 212 B.C. Vitruvius, describing the force-pump in- Ctesibius, the greatest mechanic of antiquity after Archimedes, it was made of brass; at the bottom were two buckets near with pipes annexed, in the shape of a fork, united to a basin dle. In this basin were valves neatly fitted to the apertures of which, closing the holes, prevented the water, which had been the basin by the pressure of the air, from returning. Above was a cover like an inverted funnel, rivetted so securely on it ater would not under any pressure force it off. On this was pright pipe, called a trumpet. Below the lower orifices of the buckets were furnished with valves over the openings below. ade round and smooth, and well oiled, were fastened to the buckets d from above with bars and levers, which, by their repeated action, pressed air into the pipes, and the return of the water ented by the closing of the valves, it was forced into the basin e mouths of the pipes whence the force of the air which pressed the cover drove it upwards through the pipes, and by this means lower level might be thrown into a reservoir for the supply ns, &c.

an be no doubt that considerable knowledge and experience in g existed in all civilised countries in ancient times, although of the methods adopted are very imperfect. In examining the dern times, and the mode of their construction, the materials for ion are ample. M. J. Degousée gives an account of the method rtesian wells in China, as related by a French missionary, who he had seen in China many bored wells of 5 or 6 in. diameter, 500 to 1800 feet deep. He says that in the canton of Ou-Tong- are many thousand wells in a space of 10 leagues long by 5 bore these, they commence by placing in the earth a wooden r 4 in. diameter, surmounted by a stone edge pierced by an ori- 6 in.; then in the tube a trepan is allowed play, weighing 300 . A man mounted on a scaffold swings a block, which raises 2 feet high, and lets it fall by its own weight. The trepan is the swing lever by a cord, made of reeds, on which is attached of wood; a man sits close to the cord, and at each rise of the es the triangle, and gives a half turn, so that the trepan may ling another direction. A change of workmen occurs every six the works are continued day and night, yet they are some- e years boring to the requisite depth. These wells nearly al- a great deal of inflammable air, and there are some which furn- but gas; these are called fire-wells, and it appears that the mploy them for supplying combustible gas, which is, without buretted hydrogen, such as proceeds from coal mines. The actised by M. Selon, near Sarbrook, in China, consisted in using vy bar of iron, about 6 feet 4 in. in length, and 4 in. in dia- ed at its lower end with a cutting chisel, and surrounded with hamber, to receive through valves and bring up the detritus of nted stratum; it was suspended by a rope which passed over a d as the rope was pulled, the rod in mounting received a circu- , which was sufficient in its descent to turn round the chisel. hamber was full, the whole apparatus was lifted and the earth t, when the chisel was again dropped, and the work continued. 0 feet deep are bored in this manner by the Chinese, who fre- rforate holes in the earth 18 in. diameter, and several hundred th, to give ventilation to their mines. This plan is now usu- n as the Chinese system of boring.

t great modern improvement in well sinking in England was Mr. Benjamin Vulliamy, of London, who is said to have been o complete an overflowing well by means of a perforated tube. my finished his arduous task in 1794, and presented the Royal th a description of the plan he adopted, which was fully reported *nsactions* of the Society for 1797. The successful results of Mr. s operations, and the publicity obtained for them through the *ns* of the Royal Society, gave a great impetus to the progress of nt in well sinking in Great Britain and other countries. MM. ry, Arago, and Von Bruckmann have all drawn attention to ells, and shown that throughout Europe there are extensive dis- e, under certain conditions of geological structure, and at cer- water may be raised to the surface by boring, and that in many he supply will be sufficient, as in Artois, to turn the wheels of . M. von Bruckmann sank an Artesian well at Heilbronn, in rg, where the water was sufficiently warm to heat a paper ma- Similar wells are in use in Alsace, and near Stuttgardt, in the Modena, and various places in America, Africa, and Asia. The water in these wells is referred to the same principle as an ar- ntain, the height to which the water will rise being dependent eight of the head or source of the water, which supplies the ring strata which are pierced in making the well. Dr. E. Bruck- of Stuttgardt, has successfully applied deep-bored wells, called rtesian wells, to the purposes of draining land and removing aters.

l bored at Sheerness, in 1781, was continued through 300 feet ow which was a bed of sand and pebbles, and from which, when e water rose immediately; in another situation, this water was a depth of 328 feet. In 1824, a well was bored at Fulham ep, which, after traversing the tertiary strata, was continued feet of chalk, when the water arose and was discharged at the gallons per minute. In the Gardens of the Horticultural So- ciety, at Chiswick, the borings passed through 19 feet of gravel, 242 feet of clay and loam, and 67 feet of chalk, after which the water arose to the surface through the whole 329 ft. At Sion House the boring was continued to the depth of 620 feet, so as to enter the chalk, when the water rose in a considerable volume 4 feet above the surface. In an Artesian well sunk at Hammersmith, water rose with a considerable force from a depth of 360 feet; and at Tooting another threw out sufficient to turn a water-wheel. By the borer it was found that at St. Ouen, in France, there were five distinct sheets of water, from each of which a supply was obtained; in the third, which was at a depth of 150 feet, was a cavity, in which the borer suddenly sank a foot or more, and the water rose immediately in a considerable volume.

The well at Messrs. Truman and Co.'s brewery, London, was commenced in the middle of an old well, 16 ft. in diameter, and the work was performed by the miser instead of the usual methods. After the land springs had been drained another well, 11 ft. in diameter, was commenced, and carried down with brick steening to the depth of 115½ ft.: a cast-iron cylinder was then lowered, and others successively added. At a depth of 135 ft. the yellow clay was reached; here the water overpowered the excavations, and the miser was again used. An oyster bed was pierced 163 ft. below: the driving of the jumper through the hard rocky crust of this oyster bed occupied the workmen seven days. When this was done, the iron cylinder suddenly sank 5 ft. 6 in.; the miser was again used, until the depth of 190 ft. was arrived at, and the cylinders became completely fixed. Soon after this pumping was resorted to, and then a blow of sand from the bottom filled the well for a depth of 28 ft. The miser cleared this, and pumping again commenced, and soon after the iron cylinder separated at a joint about 73 ft. from the top. A portion of the cylinder was then cut away, and after removing the yellow clay a dome was constructed of brick and cement entirely around the exterior of the cylinder. An internal cylinder, 2 ft. in diameter, was lowered within the original cylinder, and this was continued until driven 4 ft. into the chalk. The space between the large and small cylinders was filled with granite paving stones to a depth of 5 ft., then with broken stones, brick, and hydraulic cement, for another 25 ft., to prevent any future blow of sand from the bottom of the well. The well was then drained, and about 400 holes, ½ in. diameter, were drilled in the cylinder immediately below the level of the oyster bed. The bore was then resorted to, and continued for a depth of 200 ft. more, making the whole depth 400 ft., and a supply was obtained equal to 33 gallons per minute; after the work was complete, and the joints of the cylinder picked out, all the sources combined yielded 81 gallons per minute. The total cost of sinking was 4444*l.*, and the 12-horse power steam-engine and pumps 1351*l.*, equal to 5795*l.*

The Artesian well at Southampton Common was commenced in July, 1838, and on March 4, 1842, there had been 562½ ft. sunk. Boring was then commenced, the implements necessary for which cost the contractors, it is stated, 1000*l.* The rods were worked from a stage in the well 40 ft. below surface, and carried on through the column of water, the pumping being relinquished. The boring was commenced with a 7½-in. auger and other tools, and continued to the depth of 1260 ft. Innumerable difficulties were experienced in conducting this work, which, after being continued to a depth of 1320 ft., at a total cost of nearly 14,000*l.*, was finally abandoned, in consequence of the corporation being unwilling to expend further money in continuing the borings.

The well-known Artesian well at Grenelle, near Paris, constructed by M. Mulot, was 1795 feet deep; it was completed in 1841, having occupied 7 years and 2 months in its construction. The water rises 92 feet above the surface, and it is said to discharge 750,000 galls. every 24 hours.

For the Artesian well at Trafalgar-square, London, Messrs. Easton and Amos sank two borings, which were connected by a tunnel formed of brick laid in cement, 6 feet in diam. and 380 feet long. The borings for the deepest well was 395 feet, the lower portion of which, passing into the chalk 135 feet, is not lined with tubes. The contractors agreed to furnish 100 gallons of water per minute to supply the Barracks, National Gallery, Office of Woods and Forests, Admiralty, Horse Guards, Treasury, Scotland-yard offices, Whitehall-yard offices, India Board, Downing-street, and Houses of Parliament, and, in addition, to supply 500 gallons per minute to the fountains in Trafalgar-square, for the sum of 500*l.* per annum. The whole expense of sinking the wells, erecting the engine, and laying down the mains and pipes to the fountains, was nearly 9000*l.*

Dr. Granville, in July, 1852, described the great Artesian salt springs of Kissengen; this well has been bored 2000 feet deep, and ejects the water from 50 to 70 feet above the surface, with a force equal to an engine of several hundred horse-power; the water discharged amounts to 96 or 100 cubic feet per minute, the temperature being 70° Fah. Three series of concentric tubes, of the respective diameters of 5, 3, and 2 inches, are sunk at various lengths into the bore, the smallest one descending to the depth of 1900 feet; they are made of wrought plates of brass, of ⅛ inch thick, and are used for separating the water from the different salt-water strata: the whole work was completed under the direction of Inspector Nor. The well at the fountain of the Pas de Calais is 461 ft. deep; that at Tours 259 ft., giving 246 gallons per minute; and that at Champoiseau 273 ft.; the Artesian well at the Monastery at St. Andre, near Aire, gives 400 gallons per minute; at Bages, near Perpignan, 440 gallons; that at Merton, 198 gallons; that at Rivesaltes, 176 gallons; and that at Lillers, 154 gallons per minute. At Boston, U. S., which originally derived its supply of water from wells, there were, according to a return published, 2767 wells for public use, 33 of which were Artesian.

Amongst other Artesian wells worthy of mention, may be named that at Messrs. Worralls', Mr. Lancaster's, Mr. Bury's, and Messrs. Ashton's Dye Works, near Manchester; the depths of which vary from 300 to 540 feet, the highest yield of water being 510 gallons per minute.

With regard to the implements and machinery used in well boring, Mr. Chadwick observes that, in the ordinary method of boring a well, a circular hole, about 6 ft. in diameter, is sunk to the depth of 8 or 10 ft., and one man above and two below are enabled to carry on the operation. Over the well is laid a horizontal pole, made fast at one end; the other end is given a slight up and down motion, to suit the action of the two below, it having a chain around it connected with the cross-bar, to which the boring instrument is attached. This cross-bar, or wooden handle, passes through the socket of an iron shank, which has a ring at top, and a female screw at bottom: to this all the successive boring instruments are fastened. A chisel is first attached to the screw, and the two workmen in the well press upon the cross-bar, and force it round like an auger at the same time. This will continue to descend, unless the ground is very hard, or full of stones, when it becomes necessary to drive it, and by changing its position occasionally it is made to revolve. After the first hole has been well opened, the chisel is changed for a cylindrical auger, which draws up the earth that the chisel has separated; the earth entering at the bottom fills the cavity of the auger, and, as it cannot escape, it is discharged at the top, and finally drawn up as occasion requires. There are many varieties of instruments, all of which have a screw at the upper end, lapped to one thread, and, therefore, easily fitted into the various rods. The instruments vary in their form according to the material being pierced. The common tools consist of a pick, one end of which is used as a hammer, and called a poll; the gad, which has a steel wedge; and a shovel which usually has a pointed form, for penetrating hard and coarse rubbish. The borer is an iron bar, tipped with steel, formed like a chisel, and is used by one man, holding it straight in the hole made to receive it, and giving it a constant rotation on its axis, whilst another strikes the head with an iron mallet. The hole is kept constantly cleared out by a scraper, which is a flat iron rod, turned up at one end. In boring the well at the abattoir at Grenelle, near Paris, the sounding-rod, which was composed of separate pieces connected together, soon became of great weight; every time the chisel was raised, and the shell or apparatus lowered to bring up the broken earth, it was necessary to take all the parts of the rod to pieces one by one, and bring them to the surface. This tedious process had to be gone through every time the chisel was detached, and the shell for removing the broken earth was lowered. During the latter part of the operation the sounding-rod of the well at Grenelle weighed upwards of 6¾ tons, and this enormous mass was obliged to be raised after each successive stroke at the bottom of the well.

Having thus referred to the instruments in general use for well sinking, the author commences his review of the various improvements to the present time, with a list of the English patents which have been taken out for earth-boring machines. This list contains the names of James Ryan, who took out a patent in 1805; John Goode, 1823; Robert Breart, 1844; Wm. and Colin Mather, 1845; Wm. G. Gard, 1847; Charles Gotthelf Kind and Charles Alexis de Wendel, 1850; Wm. Edw. Schottlander, 1852; Jno. Worthington and Fennel Allman, May, 1854; and Colin Mather, Oct., 1854. In addition to these may be mentioned many well-known well borers, although their improvements are not patented in this country, and amongst them Easton and Amos, and D. Greenley, London; Fauvelle, Perpignon; J. F. Lane, Wilderz, Switzerland; Mulot and Son, Paris; and John Thompson, of Philadelphia.

Mr. Breart describes certain improvements, by which the earth cut by the boring tools at the bottom of the shaft shall be immediately removed by a stream of water, in order to prevent the necessity for so frequently raising the boring-rod. He proposes to pass water down a hollow syphon pipe from a small reservoir at the top, so that as the water ascends the other limb of the syphon it may bring the particles of earth to the top. There are evidently many difficulties to be overcome in this plan, and as it does not appear to have been much used, they have probably been found to be insurmountable.

Messrs. W. and C. Mather's improvements of 1845 consist of a new arrangement of cutting tools in a boring head. A shell-pump, and a new method of giving a percussion motion to the boring instrument by means of a flattened rope round a winding drum, and actuated by a piston of a steam-engine.

Mr. Gard's improvements consist in using a cylindrical shaft, with cutters attached, made with a single bevil, inclining inwards; above the cutters is a ball valve, fitting into a circular aperture, and so arranged that when the machine is worked the borings are forced through apertures up the cylindrical shaft above the cutters, and past the ball valve, which brings the whole to the top. This machine is worked by a rope, or chain, run round a fly-wheel.

Messrs. Kind and de Wendel's improvements (which were fully described in the *Mining Journal* of Nov. 4, 1854, and Jan. 27, 1855) consist of—1. A novel construction of boring tool.—2. A method of withdrawing a clod of earth, to ascertain the nature of the soil at any required depth.—3. A compound boring tool for shafts of large diameter.—4. A scraper for striking the soil to the centre of the tool.—5. Improvements in boring shafts of a cylindrical form, by the employment of oak cylinders and iron. The former are constructed like barrels, and retained in their proper position, one above the other, by broad rings or hoops of iron; and the latter have internal flanges, by which they are bolted together. By an ingenious arrangement of flanged teeth solid cores of hard material are bored, and brought to the surface. This machine is extensively used on the Continent, and its use has effected a considerable reduction in the cost of boring for mining purposes and geological research.

Mr. W. E. Schottlander's patent (a communication) consists in the use of boring-rods, fitted inside hollow cylinders—the boring tool being of a screw shape, and so attached to the machinery at the top of the well as to receive, by the turning of a winch handle, a rotary motion round its axis, at the same time as it is progressively forced downwards. Additional rods and hollow cylinders can be attached as the boring increases in depth. For the purpose of removing the core of earth from the interior of the boring-rods, a double set of pipes may be employed, the inner ones being cleansed and returned.

Messrs. Worthington and Allman's patent claims the use of any kind of drills, bits, or tools, for boring when they receive a rotary or reciprocating motion, and the making of bits, drills, and boring tools, partly of iron and partly of steel, to prevent the necessity for frequent sharpening. The first and most important part of this patent is the same as Schottlander's.

M. Fauvelle's improvements were described in a paper written by M. Arago, and read by Mr. Vignoles, at the meeting of the British Association in 1846. The apparatus is composed of a hollow boring-rod, formed of wrought-iron tubes screwed end to end. The lower end of the hollow rod is armed with a perforating tool, suited to the character of the strata. The upper end of the hollow rod is connected with a force pump by jointed or flexible tubes, which will follow the descending movement of the boring tube for an extent of some yards; the boring tube is worked by a rotary movement, with a turning angle, or by percussion with a jumper; the frame or tackle for lifting, lowering, and sustaining the boring-rod are of the common kind; a column of water is sent down by the pump to the bottom of the bore hole, the water rising in the annular space between the exterior of the hollow boring-rod and the sides of the bore hole creates an ascending current, which carries up the triturated soil. The boring tube is worked like an ordinary boring-rod; there is, consequently, no occasion to draw up the boring tube to remove the debris, and the boring tool never gets clogged by the soil.

The jurors of the Great Exhibition of 1851 drew particular attention to the boring tools of Mr. J. F. Lane, of Wilderz, Switzerland. Water is introduced by means of hollow rods, and mixing with the powder or small dust formed in boring, is discharged through the tool by the blow of the latter in descending, keeping the bottom clear, and ready to receive the full effect of the tool. A boring of 1300 feet has been made with these tools, and with a facility of which the old tools are not susceptible.

Mr. John Thompson's improvements consist of a cylindrical iron bar, nearly filling the bore hole, and about 5 ft. long, to the bottom of which is attached a chisel for drilling. On the top of this cylinder is a swivel, with a square iron bar, about 4 ft. long, and 1 in. each way passing through an elliptical steel spring, and fixed to a rope. The elliptical spring is of four strips, 18 or 20 inches long, and embraces the side of the bore hole. The

lower disc has a round and the upper a square hole for the bar to work in; the spring acts as a brace by pressing outwardly, and remains in a fixed position while the machine is at work.

The following is a statement of borings recently made by Kind's system on the Continent, as furnished by Mr. Herbert Mackworth, C.E.:—

| Localities. | Diameter of bore. ft. | in. | Depth in Yards. | Time in days of 12 hours. | Cost of labour and material per yard. £ | s. | d. |
|---|---|---|---|---|---|---|---|
| At Montmorot Jura, No. 1 | 0 | 12 | 164 | 84 | 20 | 19 | 8 |
| ditto No. 2 | 0 | 12 | 185 | 112 | 1 | 2 | 0 |
| ditto No. 3 | 0 | 12 | 309 | in progress. | | | |
| At Stiring Moselle, No. 1 | 0 | 13 | 347 | 354 | 0 | 19 | 1 |
| ditto No. 2 | 0 | 12 | 358 | 422 | 1 | 0 | 11 |
| ditto No. 3 | 0 | 12 | 295 | 330 | 0 | 18 | 8 |
| ditto No. 4 | 4 | 0½ | 120 | 216 | 1 | 4 | 4 |
| At Guines Pas de Calais | 0 | 12 | 263 | 86 | 1 | 1 | 9 |
| At Visernes, ditto | 0 | 12 | 159 | 37 | 1 | 0 | 7 |
| Boring 764 yards deep. | | | | | | | |
| At Mondorff, Grand Duchy of Luxembourg, old system | 0 | 10 | 371 | 37 months.. | 5 | 1 | 0 |
| new ditto | 0 | 10 | 393 | 14 months.. | 2 | 2 | 0 |

The following is a list of some deep wells, executed by Mr. D. Greenley, of London:—

| | | |
|---|---|---|
| 1832—Taylor and Dyson's Brewery, Diss, Norfolk | Depth | 596 feet. |
| 1835—Sir Joseph Fuller's, Ruislip, Middlesex | ,, | 312 ,, |
| 1835—Mrs. Duncan, Taplow, Bucks | ,, | 312 ,, |
| 1839—Sir R. P. Glynn, Wimbourne, Dorset | ,, | 306 ,, |
| 1844—The Corporation of Ruthin, North Wales (the town well) | ,, | 419 ,, |
| 1847—Messrs. Jennings' Brewery, Windsor, Berks | ,, | 520 ,, |
| 1849—Gerald Fitzgerald, Esq., Burfield, Berks | ,, | 392 ,, |
| 1851—L. Davis, Esq., Plumstead Common, Kent | ,, | 552 ,, |
| 1854—Her Majesty's Dockyard, Chatham | ,, | 610 ,, |

The author then refers to Mr. Colin Mather's invention (a full description of which, with diagrams, appeared in the *Mining Journal* of June 9, 1855), and which he considers most valuable, and likely to cause great practical improvements to be introduced and adopted in all deep cuttings; and, in conclusion, observes that well sinking and earth boring will, under various circumstances, present many difficulties; and the engineer will be required to have a large amount of practical knowledge, not only of the various strata through which he has to cut, but of the most suitable boring tools to be used in each case.

## ON REMARKABLE MINERAL VEINS.—No. II.

BY PROF. D. T. ANSTED, F.R.S., F.G.S.

**A mineral vein is a crevice or fissure in a mineral mass, subsequently filled up with some mineral substance, often in a crystalline state. In stratified rocks that have undergone little alteration, where the crevices are merely the result of desiccation or elevation, the principal ones depend either on the direction of the elevating force, or on the direction of extension of the mass; but even here a certain degree of regularity and system is often observable. In proportion as the crevices are the result of chemical forces tending to produce crystallisation, they will become more regular and systematic, and more subordinate to general laws.**

To those who are conversant with the experiments that have been made concerning the action of slow galvanic currents of feeble power on mixed mineral substances containing water, the filling-up of crevices with crystalline minerals (consisting for the most part of what may be regarded as the impurities or extraneous materials of such mixed substances) will be less a mystery than it is often regarded. It is for the chemist to explain how and why this curious process of segregation (or the separation and transmission of certain parts of a mineral mass without affecting external form) takes place; but the geologist, who has studied the structure of rocks, knows that it is so, for he everywhere sees threads and strings (veins) of sulphate of lime in masses of clay, strings of flint in limestone, plate of limestone between the partings of coal, and films of marl in slightly hardened sands.

In the ordinary and little altered clays, sands, and limestones, it is not usual to find other substances in the crevices than a few crystalline earthy minerals and iron pyrites, and as all the elementary substances in these combinations are widely, if not universally, distributed, there is little difficulty in understanding the process that has gone on. In the more altered rocks, however, and even sometimes in those which are still nothing more than marls, stratified clays, and limestones, metalliferous minerals less commonly distributed through the earth's crust, are not unfrequently found, and they occur chiefly in crevices more or less parallel to one another, which have certain relations with each other, and with the enclosing rocks. Such veins, when containing metalliferous minerals, or ores, are designated lodes, and it is to them that the miner directs his sole attention, inasmuch as they alone contain the material for which he is seeking.

I need hardly say that the object of scientific mining is to discover the relations that exist in those groups of mineral veins that contain ores. In this search the unscientific miner is governed only by experience, and by certain empirical laws, learnt by experience in particular districts where mining operations have been long and extensively carried on. How far these laws are generally applicable, what other laws (if any) may be enunciated, and to what extent the indications of mineral wealth may be reduced to scientific investigation, are questions that do not admit at present of very satisfactory replies.

Nor has the chemist hitherto done much to assist the miner in these matters. Whence the various metals are derived—why they are associated in certain ways with each other, and with earthy minerals of particular kinds—why, for example, lead and zinc ores are most common in limestones, copper ores in shales, and tin ores in granite—why talcose minerals and garnets so commonly accompany native gold, and porphyries of various kinds yield the largest quantities of silver,—these, and a hundred queries of like kind, have as yet been scarcely even considered with attention, and it will require a long and careful series of minute and well-directed observations in the field, a multitude of analyses in the laboratory, and much thought and study in the cabinet, to bring them under useful generalisations which may form a part of the domain of accurate science. Meanwhile the accumulation and record of facts must form the groundwork, and it remains to consider the class of facts likely to be most useful.

FACTS TO BE RECORDED IN INVESTIGATING MINERAL VEINS.—These may be referred—first, to the nature of the country or enclosing rock; secondly, to the general condition and relations of the mineral veins of the district; thirdly, to the particular condition of the vein in question, with its embranchments; fourthly, to the relations of this vein with others adjacent and already more or less developed; fifthly, to the effect of a change in the country (enclosing rock) or veinstone on the metalliferous contents of the vein. In addition to investigations concerning these points, the condition of the veins in the district with regard to water, underground temperature at different depths, and a number of other matters hardly capable of enumeration, and varying in each particular case, are in the highest degree worthy of being recorded.

1. In reference to the enclosing rock, where important mineral veins are known or suspected to exist, the nature of the district and its general geology are very important. It is also necessary to examine into the nature, degree, and order of change in mineral composition at the surface near the outcrop of lodes; the existence and general bearing and dip of projecting ridges or ledges of hard rock, or, on the other hand, of ravines not manifestly connected with the original drainage of the district; the vicinity of porphyritic rocks if the district is metamorphic, or of metamorphic rocks if the country is crystalline; and the mode in which the ordinary phenomena of metamorphism are modified where the mineral vein and crystalline rock come in contact.

In old mining districts many of these facts are known, and they can never be neglected with safety in judging of the prospects or capabilities of a mineral property. In a new country, or little known district, they cannot safely be neglected.

2. The general nature and disposition of the mineral veins, consisting of lodes, cross-courses, and caunter lodes, with their accompanying branches, leaders, strings, slides, and flookans, may also be regarded as made out, and like the former facts already recorded in old mining districts, and, with these results of experience, the mining engineer is likely to be familiar. In new countries, or where mining has not been carried on for a long period, much will have to be determined concerning these matters; and an opinion formed as to particular veins is not of practical value without it is strengthend by reference to the general structure of the country and its systems of veins.

3. The phenomena that require minute attention and accurate record in reference to a particular mineral vein or lode under examination are numerous, varied, and sometimes difficult to ascertain. In the first place, there is the crop of the lode; its bearing not only where first seen, but generally as estimated along a considerable distance; its relation, if any, to the stratified rocks of the district, or to the principal direction of cleavage planes or joints in crystalline rocks; its variable or constant appearance when traced for some distance; and its relation with the form and physical features of the district. Next we must proceed to the examination of such openings as have been made upon it, to determine its dip or underlie; its width and magnitude; its regularity or irregularity in descending; the nature of its walls, and of the rock next the cheeks of the vein. We must then examine its contents, beginning at the crop, and noticing whether there exists that peculiar condition of spongy ferruginous quartz passing into or replaced by oxides of iron in all stages of decomposition, so well known under the names of gossan, chapeau de fer, or eisenkopf, in the principal mining countries of Europe. The nature and contents of the gossan in many instances almost characterise the lode, and are always of the greatest importance to notice, inasmuch as the actual cause of this close relation between the exposed crust and the contents of the lower part of the vein still remains to be determined. After a due and careful examination near the surface at various points, the mode in which the rich part of the lode shows itself at the contact with the gossan is perhaps the matter next in importance, and then the position that the ore occupies,—whether irregularly disseminated throughout the veinstone, or collected into one or more strings in particular parts. Here also it is essential to take note of any symptoms of swelling-out or expansion of the course of ore itself, or of the presence of occasional cavities, such as on a smaller scale are known to geologists as *geodes*, since these are often sound indications of the nature of the vein and its orey contents at some depth.

The metalliferous indications in the gossan (generally visible to the naked eye, but almost always showing a considerable amount of decomposition) require close observation, while the nature and extent of the mixture of metalliferous minerals in the part of the lode yielding ore, form the basis of another group of observations. It is well known that the cross-courses in a mining country generally contain other metals than the principal lodes, while they are often also remarkable for a more perfect crystalline condition, and a far greater admixture of metals. These observations require a certain knowledge of mineralogy, and require to be followed up by experiments in the laboratory in cases where the conditions of lode are peculiar, and the more valuable metals are sought for. Thus, gossans often contain gold, and it is supposed that the proportion of gold is larger in the gossan than on the lode. These are points, however, on which information is greatly needed.

In addition to these points, it will also be very necessary to learn how far the vein may be regarded as isolated and distinct; in what way it connects itself with others, perhaps more developed; and above all, what branches belong to it, what strings or feeders accompany it, and how these are connected with it. The branches of a mineral vein are those other veins of smaller importance, whose line of crop (produced if necessary) falls into that of the principal vein at the surface, without appearing actually to cut across it; but unless this intersection is near and evident, it must not be regarded as important. The strings or feeders are those smaller veins, more or less parallel in their line of crop, which, by the direction and amount of their dip, are clearly related to the principal one. They may either converge or diverge as they descend; but while in the former case they must untimately intersect the lode, in the latter they must have intersected it at a point now above the surface, and from which, therefore, the vein, as well as containing rock, has since been removed by denudation. As it is a matter of very general experience in mining, that when two veins, or a vein with its branch or feeder, both bearing ore, intersect each other, they are unusually rich at the intersection, the determination of subsidiary veins is of great importance.

The mode in which veins have been formed, whether by contraction, elevation, or crystalline action, and the mode in which they have been since filled with mineral matter, are also questions that require the attention of the mining engineer. While some veins have been open fissures gaping towards the surface, and partly filled with the angular or rolled fragments of adjacent or distant rocks, others are almost closed at the surface, but open out below into large cavities, only partially filled even now with mineral substances. Even in these cases the contents of the vein sometimes consist partly of fragments of the enclosing rock, and indications of origin are thus afforded which must not be neglected. It is also not at all unusual to find portions of the enclosing rock *in situ*, themselves entirely or partially enclosed within the vein These horses of ground, as miners call them, need careful examination.

It will not unfrequently happen that special attention is needed as to the mode in which the ore occurs within the vein, as it by no means follows any regular order in this respect. Thus, for example, when the general strike of a large lode is north and south, and its dip west, the ore within it may assume the form of a pipe, more or less flattened, and irregular, going downwards towards the north or south, as the case may be. In cases of this kind, the value of junctions of branches and strings will be very greatly influenced by the position of the orey part of the lode. In other cases the direction taken by a course of ore will greatly modify the other phenomena.

Almost all lodes and veins are subject to various displacements, known as heaves or slides. Intricate and complicated problems in solid geometry may arise when several movements of various extent and magnitude have succeeded each other in the same part of a vein, and all information that can be obtained in reference to these mechanical questions will need attention, and should be carefully recorded. There are certain mining districts that seem to have been especially subjected to disturbances of this kind, while others are comparatively free.

4. When the vein itself has been examined, its relations with the others with which it forms a group or system should be carefully made out. Thus the prevailing strike and underlie of the principal or champion lodes, the cross-courses, caunter lodes, principal slides and flookans, and the bearing of these on the particular lode under investigation, may point out very important facts or suggestions.

5. Lastly, the influence of change of ground on the lodes of a particular district must always be ascertained with great care. Thus, porphyritic dykes or elvan courses have a certain meaning in Cornwall, and are, therefore, regarded by Cornish miners with great interest. Channels of hard ground, often consisting of belts of quartzite or jaspery rocks, bands of hard and cherty limestone, bands of magnesian rock, and in some cases bands of gypseous rock, possess a certain meaning, which at present is guessed at from experience, but which ought to be better understood. A transition from granite to slate, or the converse, a change from limestone to grit, from one kind of schist (killas) to another, these are all matters that require to be reported on, inasmuch as their influence on the productive portions of the lodes is very much better known than explained.

Much might be added to this long list of suggestions, many of which will seem very simple and commonplace, and very unnecessary, to those whose business call them to consider these subjects. But, as I have before observed, I should not have ventured to offer them here, were it not for the extreme rarity with which one is enabled to glean from the reports of mining engineers even the most essential facts on which a judgment has been based, and the almost total absence of such systematic statements as may lead ultimately to useful generalisations. A part of this neglect, doubtless, arises from the feeling that the public, to whom such reports are addressed, neither understand nor cares for anything beyond the resulting opinion; but a higher sense of duty towards science ought to be cultivated, and I shall be glad if these suggestions and the memoirs that follow them induce others, who have similar information, to bring it forth for the general good.

ECONOMIC VALUE OF MINES NOT CONSIDERED.—Before closing these introductory remarks, and commencing the description of particular mineral veins, I wish to have it clearly understood, that all the observations on mines or mineral properties which I shall at any time bring before the society will be strictly confined to the scientific bearings of the case. The commercial value of mining properties is a matter altogether distinct, and depends on many other points than the presence of a rich or promising lode. This, indeed, will be evident to any one who considers for a moment not only the variable price of mineral produce of a given per centage in different places where the ore is reduced, but the great difference in the value of ores on the spot where they are raised, owing to the extremely variable nature of the local charges incurred in opening mines, raising the ore, dressing it, and reducing it to a metallic state. So much is the value of mines influenced by these matters, that small veins, and veins containing very poor ores, are now actually being worked to large profit in some districts, while other veins far larger, containing the same kinds of ore in a much richer state, and apparently in all respects more valuable, but placed differently, and in other districts, are not only worked without profit, but have been the source of ruin to all concerned. It is the province of the mining engineer not merely to give an opinion as to a vein itself, and its prospects, but also to find out whether a mining property is likely to pay for working. In describing mineral veins, however, no such economical considerations can properly enter, and no one need imagine that, in speaking of a lode as rich or promising, I express a favourable opinion as to any mine worked upon it; nor, on the other hand, does it follow that, in speaking of a lode as small, or the ore in it as poor, the property so referred to is of little value, or would be worked at a loss.

## SPANISH MINING AFFAIRS.—No. III.

The indications of cinnabar are very numerous in the carboniferous formation of the Asturias. It occurs indifferently in the mountain limestone, in sandstone, and in the black schist, and is occasionally intimately associated with the coal itself, having been evidently injected by sublimation. In no case does it form part of a regular lode, but appears either as a pipe vein, as in the limestone, or it impregnates a bank of schist, the sublimation having been effected, apparently, conformably with the strata. Several mining companies have been projected for the working of the cinnabar and the extraction of the quicksilver in and near the villages of Mieres and Pola de Lena. In the first line stood the Anglo-Asturian Mining Company: it possessed five mines, but only one of any importance. This mine is situated near a miserable cluster of houses, called Munon, about one league from Pola de Lena: it is known by the name of La Eugenia. The cinnabar ore, associated with a large quantity of realgar, crystallised carbonate of lime, and an argillaceous limestone, forms an almost perpendicular pipe vein in the limestone: its form in detail is that of a series of pockets, joined by narrow necks, as in the case of some lead deposits. In the levels several small lateral branches have been cut, and also a clay run, which contained a large quantity of pure cinnabar, in the form of rolled pebbles, very smooth on the surface, and bearing the evident marks of the action of water. A thin seam of impure coal was also intersected, which contained a very notable quantity of cinnabar. The great bulk of the cinnabar is associated with realgar, or sulphuret of arsenic, both of these minerals being nearly pure, and the latter at least eight times more abundant than the former. The cinnabar presents no traces of crystallisation, and yet I have been unable to discover any trace of arsenic in very clean specimens that I tried for that metal; nor, on the other hand, have I been able to detect any mercury in the realgar: this latter mineral has an apparently crystallised structure.

The works in this mine, from the very nature of the deposits, are extremely irregular, and certainly, as a whole, the mine presented (1851) no encouraging feature. The present low price of quicksilver must have considerably damped the ardour of the cinnabar miners.

The ore in the Eugenia Mine has been dressed by the processes usually employed for copper and lead ores. In spite of the high specific gravity of the cinnabar, it possesses, like several other ores, when in a comminuted state, the property of floating on water, and this occasions a considerable waste in the fine sized and crushed ore, subject to the action of water. This process is undoubtedly very vicious, and it would have been preferable, had circumstances permitted it, to have reduced the ores on the spot, and have thus avoided the greater part of the water dressing, the principal object of which is the reduction of the transport cost. The metallurgical treatment of poor quicksilver ores presents no difficulty whatever; it is more a question of cost of labour and fuel than a loss of metal. The common run of wages in the mine was as follows—for miners, 5 to 6½ rials per day; labourers, 4 rials; boys 1½ to 2½ rials; and women 2½ rials. The rial is worth about 2½d.

The other mines of this company have only produced some few tons of ore, and the prospects are not cheering.

The quicksilver reduction house of the Asturian Mining Company is situated within the same inclosure as the ironworks. The process followed is that of reduction by quick lime, in cast-iron retorts. The ores brought to the works for reduction vary much in the proportion of arsenic and cinnabar they contain, and the dose of lime used is in proportion to the sulphur contained in the two sulphurets to be decomposed by the joint action of the lime and heat.

Except in very small parcels, the ores treated never contained beyond 12 per cent. The average of the picked ore was about 5 per cent.; the ragging and water-dressed ore, 4 to 10 per cent.; and in many cases, when the carriage of the ore from the mine was low, I have found it advantageous to treat ores of 2 and 3 per cent. without further mechanical preparation. The dried ore is ground by an edgestone mill to a tolerably fine powder, and the quick lime is ground still finer, under the same mill. The latter is ground every two days, and preserved in covered boxes, with the view of preventing the absorption of water, and the conversion of the quick lime into hydrate: this hydrate is particularly troublesome during the distillation, from the evolution of abundant vapours, which invariably cause a loss in the mercury. This metal is remarkably susceptible of volatilization, and of being retained in the form of vapour, even at comparatively low temperatures, by the action of the vapour of water.

The mixture of the ore and quick lime is effected on the floor of the retort-house, by means of a shovel. The retorts, previously brought to a red heat, are then charged with this mixture in much the same manner that gas retorts are charged in this country. The first retorts mounted on these works were large and D shaped, weighing about 30 cwts. each. They were mounted and first put to work by the Messrs. Manby, and answered the purpose very well. The delivering tube is formed of a projecting nozzle, 7 in. square, to which is bolted a T piece, forming with its long arm a tube, descending to a cast-iron recipient; both short arms are flanged, the one side being bolted to the retort nozzle, the other having a door screwed and luted on; the object of this door is to admit a clearing bar when the nozzle becomes, as it often does, choked by metallic arsenic. The charging orifice of the retort is secured by a cast-iron door, luted on with clay, after the manner of a gas retort. The cast-iron receiver is partly filled with water, so as to form a slight water joint.

The general composition of the cinnabar ores, as resulting from a great variety of analyses, are as follows:—

| | | |
|---|---|---|
| Bi sulphuret of mercury | 2 to 12 | per cent. |
| Realgar, or protosulphuret of arsenic | 2 to 40 | ,, |
| Carbonate of lime, as limestone and crystalised spar, together with clay, forms the bulk of the ore. | | |
| Iron pyrites | ½ to 5 | ,, |
| Coal, a small quantity. | | |

Before making the charges, the retorts are raised to a distinct red heat, and constantly maintained at the same temperature. The first effect of the heat is to drive off the water contained in the charge, the second to sublime a portion of sulphuret of arsenic, in the shape of a dirty yellow powder: after that commences the decomposition of the sulphurets, and the distillation of the mercury and arsenic. The two metals are invariably mixed with a certain quantity of sulphuret of arsenic. I consider the perfect decomposition of this sulphuret on the large scale to be troublesome, however large an excess of lime may be used. If the ore operated upon is not rich, the greater part of the mercury will be found in the shape of minute globules, intimately mixed with the metallic arsenic, the latter in the form of a coarse powder.

As may be easily conceived, from the variable quantity of sulphurets in the ore, the duration of the distillation also varies for the same amount of charge. In actual practice, however, I have found it convenient to render the duration of the distillation invariable, and to vary the weight to the charge in such a way that the distillation should be always completed in the same fixed number of hours. As fuel and labour are cheap, the small loss on these items was of very little consequence, compared with the loss of so valuable a product as mercury, which would have resulted from adopting irregular hours for charging and uncharging. The recipient house was kept constantly locked up, as the mercury was liable to be pilfered. The charge for each retort was sometimes as high as 400 lbs. If the ore contained but a small quantity of realgar, about 80 lbs. of quick lime would be used to the charge, and if it were very arsenical the charge would sometimes be 150 lbs. of ore and 150 lbs. lime. The retorts were uncharged and charged every morning at 6 o'clock. The uncharging commenced by taking down the small doors covering the T piece leading to the recipient. The appearance of the inside of the nozzle of the retort, and the pipe leading to the recipient, varies according to the quality of the ore that has been treated; in some cases the nozzle presents a thick laminated coating of metallic arsenic, exceedingly hard, and showing a fracture more or less metallic and brilliant; lower down the tube, and attached to the sides, may be seen a crumbling mixture of metallic and sulphuret of arsenic, with globules of mercury, and at the bottom of the recipient itself, in the water, a mixture of arsenic, sulphuret of arsenic, and mercury, in a sandy and scaly form, and in a fine mud, mixed with globules of mercury. In the case of a rich ore, containing 45 per cent. mercury, and but very little arsenic, I have scooped out from the bottom of the recipient a dirty metallic looking paste, in appearance very much like an amalgam of zinc, and which would take the impression of the finger, but on being pressed slightly in the hand, and allowed to remain a short time, became converted into fluid mercury, with a small quantity of a dark coloured powder floating on the top.

Immediately on the doors being opened, and the air allowed to penetrate into the interior of the retorts, a thick cloud of white arsenic rolls out, and partly fills the receiving room: two workmen immediately proceed with long chisels and hammers to the cleansing of the nozzles and elbows, by chipping off the solid encrustation. Generally speaking, it does not take a long time, but it is an operation extremely disagreeable to those men who have not been accustomed to it. The doors being luted and replaced, the workmen then proceed to the uncharging of the residues of the distillation. The large doors being taken down, and the interior of the retort exposed to the action of air, a large quantity of the vapour of white arsenic, with sulphurous acid, rolls forth, and fills the upper part of the retort house, and in windy weather completely envelops the men. Of the little effect the arsenical vapour has upon their health I shall speak hereafter. The uncharging of the residue in the retort is effected by means of a long-handled iron rake: this residue is drawn into a sheet-iron box, mounted on wheels, and placed immediately under the mouth of the retort; this box has a slide bottom, in the form of a damper, which is drawn out when the box arrives at the point where it is to be discharged of its red hot contents. The new charge, already prepared, and the further end, turning it over smoothly, and withdrawing it on its edges; the second scoop is turned in the opposite direction, and the charge is thus distributed evenly on the bottom of the retort. This operation is performed quickly, and by three men, and the door, already prepared and luted, is screwed on.

Returning to the products of the distillation, the medley contents of the recipient or receiver (called "calejas," or heads, a term borrowed from Almaden), are scooped out of the water by means of an iron ladle, pierced with holes, and the whole collected in strong iron buckets. A portion of fluid mercury remains at the bottom of the recipient, and is drawn off by a tap-hole, made for that purpose. The "calejas" are then taken to a press, which should have been an hydraulic one, and submitted to a powerful pressure, with a view of extracting part of the mercury in a fluid state.

## IRON MAKING AND COAL MINING IN AMERICA.

TO THE EDITOR OF THE MINING JOURNAL.

SIR,—In your Journal of May 24 I saw a notice of some large iron-works in America, and as the subject may be an interesting one to your readers, I append some particulars respecting the Montour Iron-works, Danville, Montour county, Pennsylvania, and the Mammoth Shaft Colliery, St. Clair, Schuylkill county, both of which are among the most extensive of the kind in the United States:—

The furnaces, yards, offices, and other buildings belonging to the Montour Company occupy nearly one-half of Danville, whilst its rolling mill is the largest of the kind in America, and stands on a plot of ground nearly 200 yards long by 100 yards wide. Here, about the year 1842, the first anthracite furnace was erected, by the Messrs. Chambers and Biddles, which superseded the old charcoal furnace, erected by Burd Patterson many years before. In 1844-5 another furnace was added by the Montour Company, since which period, despite many drawbacks, the works have gradually increased, until they attained their present magnitude. At three mills 1000 hands have been employed in various capacities, whose wages ranged from 4s. to 12s. 6d. per day. From the rolling mill 100 tons of T rails, from 60 to 70 lbs. to the yard, are turned out daily, whose average composition is two-thirds puddled and one-third re-heated iron, but they are now making some for the Reading Railway, composed entirely of re-heated iron. From these works they send out nothing but large sized rails, which are solid, and have the appearance of possessing great strength and consistency. The company has in operation 72 puddling and 11 re-heating furnaces, besides 2 rail mills. These, with the accompanying machinery, and the busy hum of labour, present a striking scene of activity and bustle. For the purpose of driving the fans, puddle trams, rolls, and other mechanical contrivances, five steam-engines are used in the mills, which are of 90, 60, 40, and 30 horses power respectively, averaging 250 horse power in the mill. At the furnace three 90-horse engines are employed, and one 30; besides which there are others in operation at the mines. The fuel chiefly consumed for puddling purposes is the Pittston coal, or the lower strata of the Baltimore vein, the purer measure being too hard and brittle for that purpose. But the hard and denser varieties are prepared for the furnaces. Of the various descriptions of coal used they are said to consume at times above 100,000 tons annually. The Montour Company mine all their own ore, and quarry their own limestone from their lands on the Montour Ridge, of which they have over 12,000 acres. Their openings are numerous on the three veins of ore, but extensive improvements have only been made on two of them, by which the ore is brought up from below the water level by steam power.

The Mammoth Shaft Colliery is situated in the town of St. Clair, Schuylkill county, Pennsylvania, and is now in the occupation of Messrs. Kirk and Haun. It was originally erected by Mr. E. W. McGinnes, the propounder of the "McGinnes' theory." The shaft was planned or suggested by Mr. A. Lawton, who was early convinced of the undulating formation of the coal beds of the county. It is 320 feet deep, and is sunk on the Mammoth vein more than half a mile from its out-cropping on the hills. It is large and commodious, containing ample room for a double acting hoisting apparatus, with wagons capable of carrying 2 tons of coal each, having also convenient pump-ways for double-acting pumps, with intermediate travelling ways for the ascent and descent of the miners. From the bottom of the shaft the gangways branch off east and west with the strata of the vein, which on this sett has a run of 5800 yards, with an average height of breast exceeding 700 yards. This immense bed of coal ranges from 20 to 150 ft. in the thickness, giving perhaps an average of about 30 ft., and is but a small portion of the Mammoth vein, as it exists throughout the country, being independent of the Seven Foot vein, which is 15 feet above it, and has been cut by tunnel, 25 yards south of shaft. The veins in the shaft dip at the rate of 12°, and are consequently favourable for mining coal, admitting of railroads in every direction, and of the drift-cars being taken into the breasts, which are run off from the main or caunter gangways diagonally, or across the dip of the veins, giving a favourable grade to the roads. Here the miners load their own coal directly from the face of their breasts into the wagon, and once handling it is all that is necessary before it goes into the breaker. By this means they have an opportunity of selecting the coal, and leaving the bone, or slate, in the mine, which could not be done where the veins are worked by runs, as they generally are when the incline is over 35° or 40°. The productive capability of this colliery is over 1000 tons per day, and about 1200 tons of coal can be piled in the bins of the two breakers at the shaft and the slope, which are about a quarter of a mile apart. Six engines are employed in hoisting, pumping, and breaking. At the slope there are two hoisting engines, of 30 horse power each, which work in connection, and are so regulated in power that no decrease is ever experienced in motion or strength. A wagon can be hoisted every minute, and so completely and nicely is the power regulated that they can be stopped to an inch. The pumps in the shaft are 14 in. diameter, double acting, and divided into two lifts. But, perhaps, the most striking and novel feature of these works is the system of ventilation adopted, which is that known as the furnace mode. The new air course, which has been holed so successfully, is a complete triumph in the miner's art. It is 635 yards in length, and 7 ft. by 12 ft. in the orifice, and is partitioned off by a brattice into an upcast and downcast course, which was probably the only way in which so long a heading could be driven. The upper course is 9 feet in width by 7 feet in breadth, and the down course 3 feet by 7 feet. It is believed that this one air-shaft will be sufficient to supply the mine with air until the whole of the available coal can be extracted. The coal raised from the bottom of the shaft is the heaviest sent to market, and is as pure and perfect as any found in America. The quantity of slate and bone intermixed is very small, and less than is found in other parts of the same veins, which arises, in all probability, from the fact before alluded to—that the miners have great facilities for selection before sending the coal to surface. The only other feature connected with this gigantic establishment is the surface works, which are very imposing, being composed of extensive blocks of timber, which cannot fail to strike the spectator at once with wonder and admiration at the extent and spirit of our commercial enterprise. America has much to be proud of, but I am inclined to think she exceeds herself in the energy and determination with which mining of every description is prosecuted.

A TRAVELLER.

ARTIFICIAL STONE.—Mr. William Hutchison, of Tonbridge-Wells, has specified his new patent for "improvements in manufacturing artificial stone, and in giving colour to the same." This invention relates to a peculiar preparation of sand, loam, chalk, gravel, shingle, plaster, cements, lime, or other similar loose and friable substances, combined with coal tar, common resin, or other suitable resinous or bituminous material, whereby a new compound is produced, which may be moulded into blocks of any desired shape, and coloured according to taste. These blocks, when completed and hardened, are perfectly impervious to wet and vermin, and durable in the highest degree. To manufacture an artificial stone of a dark colour, coal tar is used, but if a light artificial stone is required common amber resin is employed. The tar is freed, in the first place, from all its aqueous and some of its oleaginous constituents by boiling it, and distilling and condensing the same through pipes, until it becomes so far consistent as not to give off any oily or fatty substance to this temperature. If properly prepared it will set perfectly hard when cool, and will not yield to pressure. Previous to submitting the materials to pressure they are dried on metal plates, heated by hot air or water, or by placing them on any surface of brick or stone heated by furnaces or otherwise. The proportions used are about one gallon of sand or other friable substance to one quart of coal tar prepared as before described; or one gallon of sand or other friable substance to about one pint and a quarter of resin in a heated state. These materials are mixed, in a heated state, until they become thoroughly incorporated: the mass is then compressed in a warm metal mould, of any desired form. The moulds employed should be made in two or more pieces, so as to be capable of being thoroughly secured together, and yet readily disengaged when desired. When composed of metal, the mould should be perfectly smooth inside, and the pressure applied gradually. Everything used with the aforesaid process should be kept warm, but the materials, when compressed, should be relieved from the mould as soon as moderately cooled. In order to obtain coloured artificial stone, the ingre-

or bituminous substance may be colored while in a boiling state, or the sand or other material may be colored previous to its incorporation with the aforesaid ingredients. According to one mode of operating, the tar or resin after having been treated, as before described, in place of being reduced to a liquid state by boiling, may be reduced to a fine powder and mixed with the sand or other material, also reduced to a powder, over a hot plate; and when sufficiently heated as to become incorporated together, the mass may be compressed into moulds. The artificial stone, prepared by any of the methods hereinbefore described may again be brushed into a fine powder, and mixed with about 28 per cent., more or less, of lime or other plastic material, and used, when cold, as a cement for internal and external application. The patentee claims, "the manufacture of artificial stone, of any desirable colour, by incorporating sand, loam, chalk, gravel, shingle, plaster, cements, lime, or other similar loose and friable substances, with tar, resin, or other suitable bituminous or resinous substance, and by compressing the compound mass in moulds, as hereinbefore described."

# Meetings of Mining Companies.

## AGUA FRIA GOLD MINING COMPANY.

An extraordinary general meeting of shareholders in this company was held at the London Tavern, Bishopsgate-street, on Monday, to consider the propriety of dissolving the company, and accepting an offer to purchase its plant, machinery, and property, made by the Quartz Reduction Company,

Mr. T. E. HEADLAM, M.P., in the chair.

Mr. W. J. VIAN (the secretary) read the notice convening the meeting, the minutes of the last (which were confirmed), and the following report of the directors:—

The shareholders have been summoned to this extraordinary general meeting to empower the directors to deal with the property of the company, with a view to its sale to the Quartz Reduction Company, and to sanction its dissolution. The directors have no alternative but to recommend the adoption of this course to the proprietors, from the following causes:—The paid-up capital of 66,467*l.* having been expended in the purchase of machinery, plant, mining claims, &c., together with upwards of 30,000*l.* obtained from the sale of gold raised from the mines, a debt was incurred in carrying on the works, which, in the spring of last year, amounted to nearly 10,000*l.* The managing director stated in his report that if this sum could be raised so as to pay off the debt, it would place the company in a position such as it had never yet attained to, and the directors were authorised, at a special meeting, on March 30, 1855, to raise 15,000*l.* by the issue of debentures, of which only 10,020*l.* was actually paid up. The above debt had been contracted by Mr. Hepburn, notwithstanding the earnest and repeated directions of the board; and in the interval which elapsed while the directors were endeavouring to raise additional capital, he conceived himself by a succession of disasters, under the necessity of contracting a further debt, or of selling the property; and, with the ruinous rate of interest current in California (36 per cent. per annum), the amount of fresh debt rapidly increased to 7000*l.* It should be stated that Mr. Hepburn believed himself justified in disobeying the injunctions of the board, from the confident expectations of the mining engineer that when the vein should be cut in a lower level, to reach which the debt had been principally incurred, sufficient returns would be obtained to clear off the liabilities in a few weeks' working. These expectations were disappointed at the part of the vein which Mr. Attwood first reached, and there was no money to make a further experiment; but subsequent experience proved these expectations to have been well founded, the last accounts from the mine giving the results obtained from some small parcels of rock raised from other parts of the vein, which were extremely satisfactory.

The position of affairs as above detailed was fully submitted to the proprietors at the annual general meeting in December last, and the directors were then authorised to raise a further sum of 15,000*l.* They were prepared to contribute largely themselves, and many of their friends were ready to do the same; but, notwithstanding all their efforts, the general body of shareholders remained entirely passive, and the directors were reluctantly compelled to put a stop to all further expenses in this country, by closing the offices, and to inform Mr. Hepburn that it was useless to look for further capital from this side.

Mr. Hepburn has written in reply, that unless a sum of at least 6000*l.* be forwarded, to pay off the most pressing creditors, he will be unable longer to save the property from absolute sale; and from the scarcity of capital in the country, it cannot be expected, at a forced sale, to realise more than a small fraction of its value.

Under these circumstances, several gentlemen, largely interested, have proposed, for their own protection, to form a new company to purchase the property of this company; and the directors have agreed, subject to the approval of this meeting, to transfer the same on the following terms:—

1. The payment of debts and liabilities of this company in California (as ascertained in a report recently received from two gentlemen of high character, who have been appointed to inspect the establishment at Grass Valley), and also of their debts in this country.

2. The allotment to the debenture holders of paid-up shares to the amount of their debentures, and the payment of one year's interest upon the same now due, either in cash or shares, as they may elect.

3. The allotment, to such of the shareholders as may desire them, of one share in the new company for every two Agua Fria shares on payment of 10*s.* for each new share, being one moiety of the value represented, 20*s.* per share.

It will be seen that by this arrangement, while the rights of all parties are duly recognised, the shareholders may, if they please, preserve the same proportion in the new capital as that they now hold in this company, subject only to such a contribution (equivalent to a call of 5*s.* per share) as will suffice to pay off the debts. With the benefit of the large expenditure of this company, thus secured at a comparatively trifling outlay, the prospects of the Quartz Reduction Company must be considered extremely promising, as the mill at Gold Hill is now working to a profit on custom work, which will be available for a dividend as soon as it is relieved from the debt and enormous interest which now swallow up everything.

It is obviously to the interest of the registered proprietors to agree to this measure, as any liability for debts incurred will attach to them, even if they have parted with their scrip. The scripholders are equally interested, as they have the opportunity to convert their scrip into shares in a new company, to be constituted with a limited liability, when it will otherwise be entirely valueless, as it can never afterwards be registered. A property which the directors believe to be extremely valuable, will thus be saved from inevitable sacrifice, with every probability of affording a return to those who have embarked their capital upon it, if they come forward and accept the foregoing proposals.

Resolutions, authorising the sale of the property upon the terms above mentioned, and the dissolution of the company, will be submitted to the meeting, and the directors earnestly recommend their adoption by the shareholders, as the best and only practicable plan for terminating the difficulties which surround the company.

The CHAIRMAN, in moving the reception and adoption of the report, said it so fully detailed their position, that he could not for his own part add anything material to it. He conceived that the terms proposed were very favourable to the company, and it was a matter of congratulation that they had been able to dispose of their property in such an advantageous manner, especially as there was no alternative before them but a sale of this description. The works could not be carried on without additional capital; and by the terms of their Deed of Settlement, it was not in their power to make a call of 5*s.* (which would clear off their liabilities), as they were in the position of a paid-up company—indeed, if they did, there was no reason to suppose it would be responded to, as, out of the 10,000*l.* raised on account of the 15,000*l.* debentures, the greater part of this voluntary call fell upon a few, whilst the mass of shareholders did not come forward to contribute towards it. In this position, and without the means of raising the requisite capital, a sale became absolutely necessary; and the only question was, how they should sell? The terms offered by the Quartz Reduction Company were such, that the interests of all were fully cared for. The registered shareholder could get a share in this company upon the payment of 5*s.* If he held two shares, he would have the fifty-thousandth part of the property upon the payment of 10*s.*, which would give him an interest to the extent of a fifty-thousandth part; and he, therefore, stood exactly in the same position in the new company as in the old. They had made an arrangement, also, for those who had bought scrip, and would receive it up to a certain date; so that they would have an opportunity to sell in the interim, but the scrip could not be registered after the stipulated time. With respect to the debentures, he could only say they were to be paid off either in shares in the new company, or by one year's interest; so that all persons having any interest would receive a proportionate benefit. For himself, he felt so strongly on the subject, that he would not only ask them to pass the resolution, but he would request them to forward, as far as they could, the views of the new company. It would be under the provisions of the Limited Liability Act, and there would be no responsibility beyond the 5*s.* per share. He could not help thanking the very numerous meeting present, not only for their attendance now, but for the uniform support which the directors had received from them in their endeavours to realise expectations. It was true the concern, from the first, was in its very nature highly speculative; and though it had not turned out as they might have anticipated, still he should be very sorry had it prevented them from solving the question as to whether quartz-crushing would be profitable or not in California. The recent reports of operations left no doubt that, ultimately, it would be remunerative.—The Chairman concluded by moving that the report be received and adopted.

A SHAREHOLDER conceived that, if they adopted the suggestions of the board, they would be still in the same position as in raising a call. He was not, for his own part, disposed to pay 5*s.* more per share, but would suggest that every shareholder having four shares should receive one share in the new company for them. He was for a length of time a holder of 1000 shares, and a friend of his also held largely; but he could safely say he never lost 100*l.* with more satisfaction than in this instance, from the confidence which the directors had inspired; but he did not like to put down 250*l.* more. Not that he doubted of the success of the new company, whose position was something like that of the farmer and the miller: he took his grist to the mill to be ground, with all the risk of raising his crops, and the miller soon made a fortune.

Mr. J. CLAY (a director) observed, in reference to the remarks of the honourable proprietor, that his proposal was merely to transfer from one hand to the other, which could not be done. Supposing his suggestion to be adopted, where was the money to come from to pay the debts of the company?

A SHAREHOLDER submitted that the money should be raised by the new shares. He thought that a sum of something like 25,000*l.* could be raised in this manner by shares at 1*l.* each.

The CHAIRMAN said, the question before the meeting was the adoption of the report.

A SHAREHOLDER remarked that he was not not going to oppose the passing of the report; and, as a debenture holder, did not hesitate to pay his contribution to the new company. But before doing so, if not out of order, he would like to ask what would be the position of the company in reference to the Chancery suit pending?

Mr. G. ROOPER replied, that the position of the Chancery suit depended upon the meeting. If the report were adopted, it would be absolutely at an end.

A SHAREHOLDER said, this was the first he had heard of a Chancery suit, and would suggest the propriety of the directors placing the meeting in possession of the facts connected with it.

The CHAIRMAN said, it was a suit for some shares which a gentleman considered himself entitled to. They were some of those given to Messrs. Palmer, Cooke, and Co., and which the directors thought could not be transferred until they received the transfer of those gentlemen. The suit, however, would now be at an end.

Mr. G. CLIVE, as a director, was perfectly ready to take his share of the Chancery proceedings, without troubling the shareholders at all, for he had not the slightest belief in its ever being successful.

The CHAIRMAN remarked that, whatever might have been the result of these proceedings, the directors would have paid the costs incurred, without troubling the shareholders—indeed, they had each arranged what proportions they were to pay.

A SHAREHOLDER wished to know the position of the debenture-holders?

The CHAIRMAN replied, they were in the position of subsequent mortgagees.

A SHAREHOLDER considered they were placed in too favourable a position, as compared with other proprietors.

Mr. J. CLAY said that, independent of their legal claim on the company, their moral claim should not be forgotten, as they came forward when no one else would.

The subject here dropped, and the report was unanimously adopted.

The CHAIRMAN next moved a resolution to the effect that the meeting approves of the proposal of the Quartz Reduction Company, and sanctions the sale of the machinery and plant of the Agua Fria Company on the terms specified in the report.

Seconded by Mr. J. CLAY, and carried *nem. con.*

The CHAIRMAN then proposed that this company be and is hereby dissolved.

The motion, having been seconded by Mr. J. CLAY, was twice put to the meeting, and each time adopted without a dissentient.

In reply to several questions, the CHAIRMAN stated that the scrip could not be exchanged after July 5. A *pro forma* meeting will also be held on July 14.

In the course of conversation, it was stated that the crushing operations were yielding a profit of 500*l.* per month, which would be available for a dividend when the liabilities were cleared off.

Votes of thanks were then given to the Chairman and directors, and the meeting, which was very fully attended, separated.

## FORT BOWEN GOLD AND SILVER MINING COMPANY.

The annual general meeting of the shareholders was held at the London Tavern, Bishopsgate, on Tuesday,—Capt. CHARRITIE in the chair.

Mr. WEBB (the secretary) read the notice convening the meeting, and the minutes of the last, which were confirmed.

The report was next read, which detailed the reports from Capt. Tregoning and Mr. Greig, and which have already appeared in the *Mining Journal*.

From these extracts it will be seen, although many difficulties have had to be encountered—1. That the value of the mine is established beyond a doubt. It is proved that gold exists in abundance, and that when sufficient stamping and reducing machinery is put in operation, the yield must be enormous. With six heads of stamps only at work, the following amount of produce has been received, commencing from Feb. 8, and it will be recollected that the engine has only worked irregularly as yet:—From February 8 to June 16, 584 ozs. 3 dwts. 10 grs. of gold dust, realising 1137*l.* 13*s.* The average value of the gold dust is something less than 2*l.* per oz.; but the price of the dust is no criterion of the value of the gold, as the dust might be sent home richer; but to do this would involve longer manipulation, and the loss of fine gold, which is unnecessary, as freight is paid only upon the realised value of the remittance in gold and silver.—2. That a supply of labour at a reasonable rate may be relied upon when a regular mode of supplying provisions (which it is as well to observe has been just commenced, the directors having sent out a supply in the *Jabez*, which they intend to follow up by other shipments), and when a better means of transport have been organised. A village of native labourers, you learn from Capt. Tregoning, is now growing up on the mine—a most significant fact, and one which cannot fail to produce confidence in the value of the mine; for the natives are professional gold-seekers and washers, and would not locate themselves in a place unless it offered advantages of a permanent character. Failing, however, a sufficiency of native labour, we learn from Mr. Greig that plenty might be obtained from Chili. When the works have once become thoroughly established, there will be no fear of getting labour to keep them fully manned, and at a much less cost than that paid either in California or Australia, or in any other gold country employing free labour. The labour cost at present ranges at from 8*l.* to 9*l.* per day, but by adopting the system of giving rations this might be considerably reduced. The directors have already instructed their manager to adopt this plan.—3. That the climate is not a material drawback to the enterprise; that care is required on the part of Europeans, both with regard to diet and undue exposure to the heat, there can be no doubt, but this is the case in all tropical climates, more or less. The deaths of the two miners last reported is traceable, as we are advised by Mr. Greig, to a due want of care in not providing (as they had an opportunity of doing, and were desired by Capt. Tregoning to do) a proper protection or covering when working exposed to the heat of the sun. No stronger proof of this can be given, than that when the miners were working underground they suffered no sickness, the air being cooler, and themselves protected, but when they rashly worked on surface, without protecting themselves by a simple covering, they fell sick. It will also be borne in mind that no case of even sickness has been reported before for the past two years, although the company have constantly had nine or ten Europeans there.—4. That means of transport exist; the present mode by canoe, it is true, is slow and expensive, but by keeping a schooner, which the company intend to do as soon as their works are further advanced, the saving of much time and money will be effected.

Having laid these statements before you, the directors now wish to direct your attention to the future. It will have occurred to you that to render this undertaking permanently successful, and to place it first on the list of dividend-paying gold mines, it is only necessary to put a larger amount of machinery in operation than you now have erected, and to organise an efficient mode of communication with the mine, so as to keep up a regular supply of provisions and labour.

On Feb. 28 the shareholders subscribed 5000*l.*, for the purpose of sending out the steam-engine which had been brought back by the *Yong Marquis* (although the subscription list amounted to 5000*l.*, yet from one cause and he other, the actual first quarter's payment only amounted to 1145*l.* instead of 1250*l.*, so that it is better to call the 5000*l.* subscription as 4581*l.* only). Since that subscription was concluded, the board have received from Capt. Tregoning information that he had discovered a place from whence he could bring to the mine sufficient water to work any mount of machinery that might be put up. The board, upon receiving this intelligence immediately consulted Mr. John Arthur Phillips (firm of Messrs. Phillips and Darlington, and, acting under that gentleman's advice, requested him to select from the machinery at the West India Docks such of it as would be suitable for the water-power. This machinery was shipped on board the *Jabez*, which sailed on May 27 last, consisting of stamps, machinery complete for 18 heads of stamps, pump work, railway iron and wagons amalgamating barrels, together with a large assortment of mining materials. At the mine there is a water-wheel complete, with the exception of a little work, which can be done at the mine. Messrs. Phillips and Darlington were also directed to prepare an estimate, to serve as a guide for the board as to the cost of cutting the leat, erecting the water-wheel, machinery, &c. The want of a knowledge of the locality, the absence of sections of the country through which the leat will have to be carried, and of reliable datum many points connected with the property, prevented these gentlemen preparing a accurate estimate; but still the board consider that, to a certain extent, it may be relied upon, a liberal allowance having been made for extra charges and difficulties.

The following is Messrs. Phillips and Darlington's estimate of cost for sending out machinery now in London, erecting same, and performing other incidental work necessary to return (say) 180 ozs. of gold per week, the sinstuff being estimated to yield 1½ oz. per ton, worth 2*l.* per oz.:—Expenditure: Freight of machinery, cutting and making three miles of water-course, &c., 2790*l.*; additional labour for ten months, passages of extra staff out and home, 1566*l.*; ten months' excess of cost, opening out additional ground for stoping, and to supply veinstuff to additional stamps, 1700*l.*; incidentals, 700*l.* = 6756*l.* It will be easily understood that in the instance it requires a larger original outlay to bring in water-power consequent upon the extensive water-course to be made, &c., than to erect a steam-engine, and from this cause the estimates of Feb. 28 are now increased upon; still, the board do not hesitate to recommend you to adopt it in preference to steam. Taking the first outlay, according to Messrs. Phillips and Darlington's estimate, at 6756*l.*, and the assets as follows—due on debentures, cash on the way to mines, cash in hand, &c. (after deducting liabilities to date, 1194*l.*), 3124*l.*, shows a deficiency of 3632*l.* No calculation is made in the above for the value of the gold dust that may be sent home from this time, or for the present cost of working, as it may fairly be presumed that the one will about balance the other; nor for the proceeds by sale of the shares that may be available under the contemplated arrangement with General Norris, referred to further on. It is, however, probable that, with the increased machinery, independent of that sent out by the *Jabez*, and *no* supposed to be in course of erection—Collyer's crusher and portable steam-engine—the excess of produce over expenditure will in some measure contribute towards the expense of making the water course and erecting the water-wheel. Messrs. Phillips and Darlington, basing their calculations on the returns of gold already made, estimate, when we have 24 heads of stamps at work, allowing ten months to complete it, the profit for the ubsequent eight months will be 4500*l.*, and upon putting up 42 heads, the monthly profit, after they are set to work, will be 1220*l.* The machinery necessary for the 42 heads is either on the mine at the present time or on its road out.

To bring in the water, and to erect the water-wheel and machinery, the additional expense that has to be incurred the directors consider you should at once meet, rather than contemplate the erection and continuance of steam-power, which will always entail heavy and constant expense, and absorb a large portio of the profits. The company possess sufficient borrowing powers, not having raised i the whole more than 6000*l.* debentures (of which 1000*l.* will be liquidated by being exchanged for shares reserved for that purpose) out of the 15,000*l.* they were authorised to raise. The directors, therefore, propose that a further sum of 5000*l.* should at once be suscribed, to meet the additional expense arising from the substitution of water for that f steam-power, which was not contemplated at the last meeting. The paying character of the mine has been placed beyond doubt, and as soon as the water course is completed (for which it is now sought to raise money), and the machinery put to work, there an be no doubt that the debentures will be a safe investment. When the shareholders onsider that with this additional 5000*l.* for carrying the water to the mines we shall benabled to work from 50 to 100 stamp heads, they must see the vast importance of suc an arrangement, as, although we shall probably be producing from 10 to 15 tines the mount of gold, the labour will, comparatively speaking, be but little increased, as the large force now employed for cutting fuel to supply the engine will be transferred to is general labour list.

The directors, in viewing the operations of the past year, consider there is much upon which the shareholders may congratulate themselves. From doubts as to the value of the mine, and to the practicability of working it you have arrived at the certainty that it is rich, and as easily worked as any other mi. From hearing that gold existed, you have had opportunities of seeing that it can be obtained and brought home. It is no longer a question as to whether the veinstuff will pay, but as to the skill and economy exercised in conducting the operations, and the amount of machinery which shall be erected, to regulate the ultimate rate of profit.

The shareholders are aware that an arrangement had been proposed with General Norris, under which, upon the fulfilment of certain conditions, he would have been entitled to receive 24,720 shares; these conditions, however, were not performed by General Norris, and it has been proposed to modify the terms both in regard to the shares and the conditions, so that 14,875 shares only would be required to perform the company's part of the contract, and 9845 shares will be available as an asset of the company. When these shares are fully at the disposal of the comny, it is proposed that the subscribers to wards the new proposed loan of 5000*l.* shall be entitled to take at any time, within six months from this date, five shares for every 5*l.* debenture which he has paid, and upon paying 5*s.* per share for them.

It is of importance that the amount of subscription should not be less than the 5000*l.* proposed, so that the directors may feel, in case ar of the negociations now on foot should not be concluded in time, that there will be funds enough forthcoming to finish the works; and it is as well to observe that until such funds are subscribed the directors are not inclined to order the leat to be made, or the waterwheel to be erected, feeling that it will be useless to commence without clearly seeing the way to the end, and they are determined to incur no liability which their funds without enable them to liquidate.

The balance-sheet for the year ending April has been duly examined and certified to by the auditors. The directors have to report that since the last annual general meeting Major Mayne and Mr. George Tate have resigned from the direction, and that they have elected Messrs. W. C. Buller, R. J. R. Cambell, and J. Clay on the board; their election will require your confirmation. The dictors retiring by rotation are Messrs. G. T. Braine, G. Clive, and F. Mangles.

They were eligible for re-election, and offe themselves accordingly. The shareholders' auditor, Mr. W. Quilter, offers himself or re-election at the present meeting.

The CHAIRMAN explained that it was the day of the directors to propose Messrs. Braine, Clive, and Mangles for re-election, but was for the shareholders to propose some others in their places, if they thought pper. He would move that the report of the directors, now read, be received, adopted, and circulated amongst the shareholders.—Mr. COOKE (Powell and Cooke) seconded the resolution.

Mr. SPRATLEY wished for an explanation as to the item, bills receivable.

Mr. BAKER, the solicitor, said they were bills given in Paris by Mr. Valentine, for the balance of his calls, and for which they held security.

Mr. COOKE wished to know whether the dictors had a proper right and title to the mines?—The CHAIRMAN said their agent at Colon was in full possession of the property of the company. The deeds were duly registered, and would shortly arrive in this country.

Mr. KIERNEY denied that the company was in possession of the property: he had the deeds, upon which he had a claim by way of mortgages.

The CHAIRMAN said their agent was a gentleman in her Majesty's service, and not likely to tell an untruth.

A PROPRIETOR enquired whether the directors of the Fort Bowen Company had settled all the claims which were justly due to the West Granada Company? and he had been informed that money had been borrowed of Mr. Kierney for the purpose of paying certain debts of the West Granada Company.

The CHAIRMAN said the Fort Bowen Company had bought the mines of the West Granada Company, and held a receipt in full for all claims, and the property was conveyed to them.

Mr. BAKER said there was no party that had the slightest claim against the Fort Bowen Company.

The CHAIRMAN said the Fort Bowen Company might make themselves perfectly easy, as the claimants were suing gentlemen connected with the West Granada for the amount, who could pay 100,000*l.* if necessary, and it would be for a court of law to decide whether the claims were just.

Mr. CLAY observed that the total amount sought to be recovered was only 12000*l.*

Mr. TATE said the directors were determined not to incur any liability, as it would be unfair to those who were registered, but the time for proposing additional capital was premature. They would soon have machinery on the mine capable of reducing from 18 to 20 tons of ore per day, and he considered the better plan would be to go on with the present machinery, as with that now on the mine, and about to be erected, at the lowest calculation, the produce would be about 20 ozs. of gold per day, and if that would not pay they had better give it up. The mines had been clearly proved to be much richer than any now worked, even those that were paying large dividends. The real question before the meeting was, whether it was desirable to make a leat at the present time, or go on with the machinery they now had.

Dr. COLLYER said there were certain practical difficulties at the Fort Bowen Mines, but they were not insurmountable. The mines were extraordinarily rich, and they had three small boilers fixed, but the wood was non-bituminous, and from the construction of the boilers they lost a great proportion of the heat in the chimney; and to attempt to work the Chilian mill with the present boilers would be absurd. To think of bringing water three miles was a perfect folly, and altogether out of the question. At certain seasons of the year the rain came down in torrents, and would destroy any embankments they might make. If they adopted water-power, they must get it from the River Belen.

Mr. ROBERTS considered it would be better to use the money raised as proposed at the time. He did not consider it fair that they should now come forward and tell the shareholders that they had found out an improved system. He was not an advocate for raising more money at the present time.

The CHAIRMAN said the board thought it was for the interest of the company that John Arthur Phillips should be appointed consulting engineer, and they were acting under his advice.

Mr. POWELL said Dr. Collyer had distinctly told the meeting that the plan of Capt. Tregoning would be a failure, and that if they used water-power the Belen River was the place to obtain it.

Dr. COLLYER considered they could meet all their difficulties. There was no doubt water was the cheapest, but they had a splendid steam-engine of 15-horse power, and another of 12-horse power, so that if they obtained the steam they could crush 30 tons of ore per day. He would recommend the directors to procure a locomotive boiler, by which they would obtain all the heat. The difficulty of forwarding it was to ascend the river, but he (Dr. Collyer) had had a punt constructed in this country, which would only would only draw 1 ft. of water, and in which he intended to send his machinery to the Belen Mines. If the Fort Bowen obtained a locomotive boiler, he would lend them his boat, and the boiler could be obtained, including freight and every expense for 400*l.*

Mr. CLAY said in the multitude of counsellors there was wisdom, but still, in some instances, there was co fusion. He considered this was not the place to decide whether or not a certain boiler should be sent out. The real question was, is the money to be raised or not. If the mines were his own and sole property, he should not be a week before he found the money.

The report was then unanimously adopted.

The CHAIRMAN then put a resolution, to the effect that the meeting viewing the great importance of using steam instead of water power, that the additional capital be raised without delay.

After a short discussion the resolution was negatived.

The CHAIRMAN next submitted a resolution for the re-election of Messrs. Clive, Mangles, and Braine. The two former were re-elected, and the latter rejected.

The CHAIRMAN said the next business was to confirm the election of Messrs. Buller, Clay, and Campbell, who had been appointed by the board since the last general meeting. Upon the names being put to the meeting separately, the first two gentlemen were elected, and the last (Mr. Campbell) was rejected by a great majority.

Mr. TATE considered it most discourteous conduct towards Mr. Campbell, who had come forward when the mine was in the greatest difficulties. He believed it would have fallen to the ground before this, had it not been for Mr. Campbell's assistance.

Mr. CLAY said, during the time he had been connected with the board, Mr. Campbell had been a most efficient member, and the loss of his services would be very severely felt.

The CHAIRMAN bore testimony to Mr. Campbell, as being a most able man of business, very methodical, and careful of the company's money.

Mr. TATE proposed a resolution, that Mr. Campbell be elected a member of the board.

Mr. BAKER said that could not be submitted to the present meeting.

Mr. W. Quilter was then re-elected the shareholders' auditor.

A PROPRIETOR moved that the sum of 300*l.* be voted to the directors for the past year, to be paid in debentures. The resolution was seconded, and carried unanimously.

The CHAIRMAN proposed that a sum of 20*l.* be given to the widows of the two miners who had died in the company's service.

The resolution was unanimously adopted, and the proceedings terminated with a vote of thanks to the Chairman.

## WEST POLBERRO MINING COMPANY.

A general meeting of shareholders was held at the offices of the company, Bath, and was unanimously attended by shareholders from London, Birmingham, Reading, and other places, on Tuesday,—Mr. A. H. ENGLISH in the chair.

The CHAIRMAN said, doubtless the shareholders had been surprised that the financial account, usually furnished with the notice convening the meeting, had been omitted, the reason of which was this, the promises held out at their last meeting by their agent, in respect to the quantity and quality of ore to be sold during the quarter, not having been realised, they thought it better, for obvious reasons, to defer any allusions to their financial condition until the meeting. He could assure them the committee were not to blame, they had all deplored the repeated failures of the promises made by their agent; and as a shareholder, holding a large interest in the mine, whose interest was identical with his co-adventurers, he was bound to state that he had felt most deeply these repeated disappointments; and it was a question with him, as well as several of the shareholders, whether the time had not arrived when their agent, Capt. Julian, should be called upon to resign; that, however, was a matter to which he would not now further allude, except to say that a letter had been sent to Capt. Julian, requiring an explanation, but the answer to which he considered quite unsatisfactory. He would now call upon the secretary to read the agent's report.

Mr. GOSSE begged to say a few words in reference to the allusions made by the Chairman to their agent, on the ground of his having originally introduced Captain Julian to his mining friends in the City: he, for one, thought the captain had been improperly pressed for favourable reports, and had altogether been too much interfered with; the promises he had made were almost dragged from him, to serve a purpose which he would not at this meeting enlarge upon, and he though it was hardly fair to make him the scapegoat of other men's faults; if a change were to be made, let it be a complete and total change; with his present views, he should not be content with the dismissal of Julian, except as the first instalment of other important changes, intimately connected as they were, in his opinion, with the prosperity of the mine.

Mr. DALLAWAY thought Capt. Julian had been much overworked, and too much of his time was taken up in writing reports and correspondence; and perhaps it was desirable that some person should be appointed to take the oversight of the mine.

Voluminous reports were then read from Messrs. N. Ennor and Chas. Thomas, both of whom had inspected the mine since the last meeting, and in many essential points these reports agreed.

It appeared from the agent's report that the engine-shaft was down 4 fms. 2 feet below the 10 fm. level, and before the next meeting it was expected that the character of the lode in the 20 would be ascertained; the appearance and present prospects generally were good, the number of hands employed 65, and it was stated that about 80 tons of mundic were ready for sale, a customer for which they were then trying to obtain.

The financial account was then submitted; the returns from sales of ore having fallen very much below the estimated amount, the Chairman announced that it was necessary to make a call of at least 2*s.* 6*d.* per share. The present liabilities were stated to be 570*l.*, and the labour cost for the ensuing three months was reckoned at 750*l.*: total to provide for, 1320*l.* The sales of ore, with the call now proposed, the committee believed would suffice for that purpose.

A call of 2*s.* 6*d.* per share was then made, and allowed.

The SECRETARY said he had received a communication from Cornwall, relative to the Rating of Mines Bill, now before Parliament. The subject was discussed, and a suggestion made that the Members for the City be requested to give the bill their strenuous opposition. No formal resolution was passed, the meeting being content to leave the matter in the hands of the committee.

Mr. DALLAWAY then proposed, and Mr. A. BOWES, of London, seconded—That a superintending captain be appointed to the mine, but that Capt. Julian be retained in a subordinate position; that the services of Mr. Mayne, the purser, be dispensed with, not being necessary under this arrangement; and that certain officers in the ore dressing department be likewise dismissed.

The MAYOR OF BATH (Mr. W. Bush) moved an amendment, seconded by Mr. FEAR—That no change should take place in the official staff for the next quarter.

Mr. MILSON, of Reading, in a long speech, supported the resolution, and was followed by several other gentlemen on the same side; the feeling of the meeting appearing to be strongly in favour of it, the Mayor courteously withdrew his amendment, and it was carried without a division.

The committee were then re-elected, with the addition of Dallaway and Fear; and a cordial vote of thanks to the committee and Chairman terminated the proceedings.

## WHEAL GUSKUS MINING COMPANY.

The general meeting of shareholders was held at the offices, Cannon House, Queen-street, on Wednesday,—Mr. JAMES ROBERTSON in the chair.

After the usual preliminary proceedings, the CHAIRMAN observed that they had met that day to receive the report of the agent, and the accounts for the last three months, as well as to make a call to meet contingent expenses.

The accounts were then submitted, as follows:—

| | | | | | |
|---|---|---|---|---|---|
| Balance from last audit | | | £2234 | 15 | 5 |
| Merchants' bills and sundries | | | 1574 | 16 | 1 = £3839 11 6 |
| Calls received | £ | 334 | 0 | 0 | |
| Tin sold | | 1168 | 19 | 6 | |
| Copper sold | | 345 | 3 | 4 = | 1848 2 10 |
| Balance against mine | | | | | £1991 8 8 |

The balance of liabilities over assets was 1443*l.* 5*s.* 1*d.*, and the company had to their credit 577 shares, which had been reserved.

Mr. MINTON moved that the accounts now presented should be adopted and passed.

—Mr. GOSLETT considered they had a good mine, if it were efficiently managed; and he had, therefore, no hesitation in recommending the adoption of the accounts.

This was unanimously carried.

The following report, from Capt. G. Francis, was then read:—

*June* 21.—Since our last meeting, in March, 6 fms. has been driven in the 70, west from the engine-shaft, on Guskus lode, which, on an average, has been 3 ft. wide, and worth from 12*l.* to 14*l.* per fm. for tin for the length named, and is now 30 fms. west of shaft; and a winze has been sunk to the 70, on the said lode, west of the shaft, which is worth from 10*l.* to 12*l.* per fm.; but the 70, not being so far west as the winze by 4 or 5 ft., is not yet communicated with the level below. The 40, on Martin's lode, west of the engine-shaft, has been driven 20 fms., and has now reached to within 5 fms. of Read's shaft, the lode for the length named being worth 6*l.* per fm. for tin. We calculate on communicating Read's shaft to the 40 in the course of three weeks from this time, which is now sinking by six men, when it is intented to put the men now employed at the shaft to drive the 50 on the said lode; the 40 having yielded some good tribute ground, and when the shaft in question is holed to the level, this part of the mine will be well ventilated, and will enable us to sett tribute pitches at from 6*s.* to 8*s.* in 1*l.* You are aware that the 30 fm. level on this lode has reached our boundary west to within 6 fms., and at this place we intersected an east and west lode, 2 ft. wide. Martin's lode, running south-east and north of west, and at the junction we had a most splendid lode for a short distance, a rock of which was forwarded to your office in London, which weighed upwards of ½ cwt. At that time, I was led to believe that we had a most valuable discovery, the lode being in whole ground to the surface; but we have driven full 10 fms. on its course east, and as it left the junction it became less productive. We are still driving east, by four men, at 40*s.* per fm., where the lode is 2 ft. wide, interspersed with lead and copper ore, and tin mixed; and we have driven some fathoms east in the 20 on the said lode, where it has a very similar appearance to the 30, but they have been productive lodes both north and south of this discovery, which leads me to believe that we shall again find it productive in driving east, and will form a junction with Orchard lode by so doing. I am still inclined to believe that our chances of success in driving east on Guskus lode are much in our favour; that is, towards our stamps and the eastern boundary. Our tribute pitches are very changeable, the lodes being of a very bunchy character, but on the whole are looking much the same as when last reported on. We shall have a similar quantity of tin for sale on the 1st July as the last sold, and expect to sample 20 tons of copper ore on Tuesday next, or nearly so, which we value at from 60*l.* to 70*l.*, one-third of which being burnt leavings, &c., is of a low quality. Our copper ore returns have been to the west of Read's shaft, on Martin's lode, for the last two or three years, and towards our western boundary in both the 10 and 20, and those backs being taken away will, to a great extent, cause the returns to fall short in copper ore from this part of the mine.

The CHAIRMAN observed, that it was desirable that further funds should be obtained, in order to meet the old liabilities; to do this, it would be necessary that a call of 2*s.* 6*d.* per share should be made.

This was seconded by Mr. PLAYER, and unanimously carried.

Mr. COOKE said there were a number of shares on which the calls had not been paid; he should, therefore, move that a special meeting be summoned, in order to forfeit all such shares on which the call had not been paid.

Mr. GOSLETT stated he considered it very unfair that those who had subscribed their fair quota should suffer for those who had not; he should, therefore, second the motion of Mr. Cooke.—This was put, and unanimously carried.

It was then moved and seconded, that the report should be printed, and circulated amongst the shareholders.

The meeting was then made special, for the purpose of electing a committee of management, when, after some discussion, Messrs. Richard Glanville, Thomas Boorman, and James Robertson, were elected for the coming three months.

A vote of thanks was given to the Chairman, and the business terminated.

## IRISH PEAT COMPANY.

A special general meeting was held at the company's offices, Old Jewry, on Wednesday, Mr. JOHN WOOD in the chair.

Mr. JESSON (the secretary) read the notice convening the meeting, and the directors' report, which stated that, in conformity with the resolution recommending that one compartment of the drying-house, with sufficient length of railway, and a suitable number of wagons, should be erected and completed to test Dr. Weber's invention, the directors proceeded to build and finish this one compartment as soon as the frost and state of the weather would permit. The building was completed early in April, and the first experiment made with 20 wagons filled with turf, when, from the damp state of the building, and more especially the difficulty of completely ventilating such great length of flues, the heat could not be raised above 120° Fahr. After two or three trials, however, they succeeded better, and it can now easily be maintained at 150°, so that the peat can be dried in eight days. A tramway has been laid down from the works for a considerable distance up the bog, by which an adequate supply of good peat will in future be secured.

The CHAIRMAN said he had that morning received a letter from Dr. Sullivan, who stated that the turf removed from the "drying-house" on the occasion of his visit appeared to have been very well dried, and certainly suffered no injury by the process. Turf thus properly dried cannot differ from air-dried turf, except in so far as it may be superior for the special objects of the company, by being more thoroughly dried than ever if could be in the warmest summer. As the state of dryness of the turf exerts a very considerable influence upon the quantity of the products obtained, and he might also add upon their quality, he had no hesitation in saying, that as the artificially dried turf might be made to contain less water than air-dried, the result of the distillation would be more favourable. A reference was made in the report with regard to the peat cutting; the whole of the turf cut on the present occasion was from the deep bog, and he hoped, therefore, they would see a great improvement. For what they required ten kishes they would not require more than six, or at the most eight. Their oil gave great satisfaction, and was already employed in upwards of 200 mills in Manchester.

After some considerable discussion, it was unanimously agreed that, agreeably to Mr. Clarke's suggestions, Mr. Owen be requested to proceed to Kilberry, and to continue the superintendence so long as his business will possibly allow him, and that the directors be authorised to complete the other two compartments of the drying-house, provided Mr. Owen, when he arrives at the works, reports that it is necessary.

A vote of thanks to the Chairman terminated the proceedings.

THE IRON MINES IN DEVONSHIRE.—The recent discovery of iron ores in the uncultivated wilds of Exmoor Forest, Devonshire, is expected to produce a complete revolution in the iron trade. Already has the district around felt the advantages in a commercial point of view, which an agricultural population contending against such adverse elements could not otherwise have obtained. The district has been taken by three of the largest iron companies in England, and their machinery and appliances, which are in a forward state of completion, will, it is estimated, raise from 200,000 to 300,000 tons of iron ore annually. The most remarkable specimen of ore yet obtained is the new pathos (white carbonate), which is used in the manufacture of steel, and for which English makers have hitherto been chiefly dependent on Sweden. A sample of this was dug from the moor, and sent to the Great Exhibition of 1851, by Mr. R. Smith, of the Grange, Southmolton, where its value was quickly ascertained; but at that period it was scarcely believed that the lodes were rich enough to pay for working. There are also found in great abundance the red and brown hematites, puddling ores, and the clay bands peculiar to the districts of South Staffordshire and Wales. A sample of ore has just been analysed by Messrs. Schnieder and Co., who have charge of one section of the mines, and found to contain 69·78 per cent. of metallic iron. The proprietors of the Ulverstone Iron-Works, Lancashire, have secured the principal share of the moor under a lease, and are rapidly sinking shafts by steam machinery to test the depth of the lodes. The remaining sections are in the hands of two South Wales iron companies from the neighbourhood of Merthyr Tydvil—the Dowlais Company (late Sir John Guest's), and the Plymouth Company. The Ulverstone Company possess one-half of the south moor, the Dowlais about 2000 acres on the west, and the other about half the latter quantity to the eastward. The impetus given to the employment of labour in the neighbourhood, and the settlement of a large population on the spot, has caused the erection of a church, which will be opened in August; and it is not a little remarkable that in digging the foundations a new lode of iron ore of rich quality and vast extent was found. The Ebbw Vale Company are at present working the iron Mines on Brendon Hills, Somerset, a little to the east of Exmoor, and have obtained an Act of Parliament for making a mineral railway to Watchet, which has been commenced. Two lines of railway, one from Exmoor to the sea coast and Lynmouth, and the other to Porlock, have been surveyed, but which will ultimately be adopted is as yet a matter of uncertainty.

THE TORBANE HILL MINERAL.—The long-litigated cause (Gillespie *v.* Russell) affecting the leasing this property, is again before the Scottish law courts, and it may be interesting to explain the new phase in which this remarkable case is now presented. The pursuers allege—1. That the defenders, very extensive workers of coal, were, prior to Jan. 1850, lessees of the minerals in Boghead, adjoining Torbane Hill.—2. In Boghead and Torbane Hill there is a mineral substance of the nature of gas coal, but more valuable than any gas coal known to exist prior to Jan., 1850.—3. Prior to that date the defenders had thoroughly investigated the nature and stratification of the coal and the other minerals in the district around Bathgate, and in particular, they had made themselves thoroughly acquainted with those in Torbane Hill.—4. In the adjoining lands of Boghead they had found the valuable stratum in question, and they knew that it was in Torbane Hill. But its existence, character, and qualities were quite unknown, except to the defenders.—5. Prior to Jan. 1850, they had ascertained the valuable character of the substance.—6. On the other hand, the pursuers were, in Jan., 1850, and for some time after the missive of lease under reduction had been granted, entirely ignorant of the existence of the mineral. Mr. Gillespie was, during the negociation, and for some time after, in a very bad state of health, and resident at some distance in a different county.—7. In Jan., 1850, the defenders, with a view of obtaining a right to this coal, proposed to take a lease of the minerals in Torbane Hill. "From the beginning, and throughout their negociation with the pursuers, they not only designedly concealed what they really had in view, in order the better to accomplish their object, but also disguised their object by false and fraudulent representations; and thereby induced the pursuers, in ignorance of the value and nature of the subject with which they were dealing, to enter into the lease under reduction."—8. They pretended that their object was to work various minerals, specifying in particular the ironstone and iron ore in Torbane Hill—pretending and falsely representing that the coal was of little importance.—9. Further in the course of their communications with the pursuers in Jan., Feb., and March, 1850, they falsely and fraudulently stated that no such gas coal as that above described, nor any similar mineral substance of value, existed in Torbane Hill, while all the time, they had satisfactorily ascertained, and perfectly well knew, that the aforesaid most valuable gas coal existed in large quantities.—10. Deceived by these misrepresentations, the pursuers granted the missive of lease under challenge, which, but for the false and fraudulent statements and misrepresentations, they would not have entered into. Article 11 of condescendence recites the lease; and 12 says the pursuers were thereby grossly defrauded, and the lordship on coal (6*d.* per ton) did not amount to one-fourth of what they were justly and fairly entitled to. The summons also concludes for payment of 150,000*l.* as the value of the minerals put out and sold by the defenders under the above lease. It appears from the concluding article of condescendence that the defenders from the date of their entry till Nov., 1854, had raised upwards of 76,000 tons of the coals, which was sold at no less than 20*s.* per ton. Besides its gas-producing properties, it yields paraffine oil, paraffina, and other products all of great value. From a ton of mineral there are obtained 26 gallons of paraffine oil, which is sold at 5*s.* a gallon, or 6*l.* 10*s.* a ton; and a ton of the mineral in question also yields as much as 13,000 cubic feet, or even more, of uncondensable or permanent gas—the light given by one ton being equal to that of 1990 lbs. of sperm candles.

* * MINING JOURNAL.—The VOLUMES for 1854 and 1855, perfect, with Index and Title-page, strongly bound, to be sold—price 2*l.* each.

## PELSALL AND BROWNHILLS COLLIERIES COMPANY

(LIMITED).—Provisionally Registered.
Capital £45,000, in 4500 shares of £10 each.

PROVISIONAL DIRECTORS.

THOMAS MORRIS, Esq., 1/8, Pall Mall, London.
MOSES IRONMONGER, Esq., Graiseley, Wolverhampton.
HENRY HOWELL HEWLINGS, Esq., Cannock-road, Wolverhampton.
THOMAS WOOD, Esq., Waterloo-road, Wolverhampton.
JOSIAH CHURCHILL, Esq., Castle Chambers, Birmingham.

BANKERS—The Midland Banking Company, Birmingham.
SOLICITOR—George Robinson, Esq., Wolverhampton.

These collieries comprise the mines for a term of 21 years under 262 acres, including three acres for 99 years, on which a public-house and 32 workmen's houses are erected.

The pits, engines, and plant are all of the most complete and substantial character.

The South Staffordshire Railway and Birmingham Canal run through the estate. From the former there are sidings to the mouth of each pit, and the Canal Company are about—at their own expense—to form a basin to facilitate the loading of boats. There are also sidings for the use of the colliery at Birmingham, Leamington, and the Camden-town Stations of the London and North-Western Railway.

The colliery has been opened at a large expenditure, and is now yielding 1400 tons of coal per week, but capable of delivering 2000 tons weekly; and there are two other pits partially sunk, which, when completed, the yield will be 3000 tons weekly. There is also valuable ironstone on the estate, which has not yet been worked.

For the coal there is the most reliable demand in the London, Birmingham, and neighbouring markets, and the quantity now raised will yield 15 per cent. on the proposed capital of the company; and with further openings that amount will be greatly increased, after providing for the return of capital.

The purchase has been made, and it has been determined to work the colliery by means of a company, under the Limited Liabilities Act. Before, however, adopting that course, it was deemed advisable to consult a mine agent, on whose character, knowledge, and experience, the fullest reliance might be placed, and it is only necessary to add the report of Mr. Southan:—

"*Batman's-hill, Bilston, May* 3, 1856.—SIR: I have fully and carefully examined the Pelsall and Brownhills Colliery. The measures of coal are excellent for house purposes, and the colliery is well situate for railway and canal transit. It is also open in a proper and workman-like manner, and the whole expenditure for that purpose is judicious and efficient. If worked with sufficient capital and skill it will yield 2000 tons per week for many years, and, with good management, yield a large profit. There can be no doubt as to the capability of the colliery under efficient management.

"George Robinson, Esq." "JOHN SOUTHAN."

A large portion of the shares are taken, and for the remaining shares application must be made on or before the 1st July, addressed to Mr. CHURCHILL, Castle Chambers, High-street, Birmingham. The calls will be as follows:—£5 per share on the 10th July, 1856; £2 10s. on the 25th February, 1857; and £2 10s. on the 25th Nov., 1857.

FORM OF APPLICATION FOR SHARES.

To the Provisional Directors of the Pelsall and Brownhills Colliery Co. (Limited).

GENTLEMEN,—I request you to allot me shares of £10 each in the above company; and I hereby undertake to accept the same, or any less number that may be allotted me, and to pay the sum of £5 per share within seven days of the Letter of Allotment, and also to execute the Deed of Settlement of the company when required.

Name .....
Profession or occupation .....
Reference .....
Address .....
Dated this day of , 1856.

## THE RUHRORT COAL MINING COMPANY.

Established at Cologne, 6th April, 1855, as a Société en Commandite, with Limited Liability, under the Law of Prussia.
To be formed hereafter into a Société Anonyme.

Capital £159,996, in 26,666 shares (to bearer) of £6 each, without further liability.

GERANT.

COLLINGWOOD L. WOOD, Esq., Howlish Hall, Durham; and of Meiderich, near Ruhrort.

COUNCIL OF SUPERVISION.

NICHOLAS WOOD, Esq., President of the Institute of Mining Engineers, Hetton Hall, Fence Houses, Durham.
W. MACKINNON, Esq., M.P., Hyde-park-place, London.
JOHN S. HILL, Esq., Cumberland-terace, Regent's-park, London.
GEORGE GEACH, Esq., 27, Moorgatestreet, London.
M. JULES LE JEUNE, Consul, Antwerp.
M. F. L. BEHR, Directeur de la Société l'Espérance, Seraing, près Liége.
M. J. N. DOGNEE DE VILLERS, Avocat, Liége.

CONSULTING ENGINEER—John Hawkshaw, Esq., C.E., F.R.S.
BANKERS—Messrs. Glyn, Mills, and Co., Lombard-street, London.
SOLICITORS—Messrs. Swift and Wagtaff, Great George-street, Westminster.
BROKERS—Messrs. Bragg and Stokdale, 6, Throgmorton-street, London.

LONDON OFFICE,—31, THREADNEEDLE STREET, LONDON.

The Ruhrort Coal Mining Company is possessed of twelve concessions (Müthungen) of a coal field, comprising upwards of 300 English acres, in the valley of the Ruhr, abutting on the Rhine below Düsseldof, which it is now proposed to open out and work, in consequence of the great demnd for coal and the increasing value of the neighbouring collieries, as well as by reason of the fact that recent borings on each of the twelve concessions have proved the extent and quality of the seams to be first-rate in every respect, as had been reported by the mining officers of the Prussian Government.

The position of these concessions is shewn by the plans, and it will be seen that, besides its immediate proximity to the navigable river Ruhr, to the shipping ports of Ruhrort and Duisburgh, and to the Rhine, this coal-field is traversed by the Ruhrort Branch railway (on which the lands purchased for the works are situated), and also by the main line of the great chain of continental railways. Consequently unequalled advantages and economy of trasport are thus secured, and the Ruhrort Coal Company will especially have the mean of supplying the whole of Holland by the Rhine, and when preferable, by the line of the Prussian and Dutch railways, which are on the eve of being completed, and being connected together.

The committee has the satisfaction to state that the liability of the shareholders is strictly limited to the amount of their abscription for shares.

The Ruhrort coal is of the richest all best quality, and well adapted for coking and the manufacture of iron, as well as for household purposes. The demand for it greatly exceeds the supply; the cost of raising it is below the average; and these concessions being more favourably situted than any in the district, from their proximity to the Rhine and the shipping pot of Ruhrort, and from the pits being immediately adjoining the main line of railways, the cost of the transmission of the coal to the consumers will be also unusually low.

Thus, as will be seen from the report of the most competent English and foreign engineers, a minimum yearly return of more than 20 per cent. on the capital of £159,996 may safely be relied upon.

This capital is considered amply sufficnt to provide for all expenses, and to establish a colliery with two pits capable of applying with ease from 200,000 to 300,000 tons of coal per annum. It also includs the payment of interest at 5 per cent. per annum until the works are in operation

The twelve concessions (Müthungen extending over more than three thousand English acres, have been purchased under the company's statutes, for the sum of 590,656 Prussian thalers, or about £89,000 sterling,—viz., £20,000 in cash, and £59,000 in shares.

Independently of the purchase of th property, there has been already expended upwards of £20,000 towards the winning, in the purchase and erection of machinery, and in making considerable progress in the sinking of pits.

It is considered that the collieries will be in full work, and with the before-mentioned pecuniary results, before Jan. 1857.

As the twelve concessions (Müthungs) of which the company has become possessed in virtue of the purchase are of sufficint extent for four distinct collieries of about 800 acres, yielding from 200,000 to 300,000 tons of coal per annum each, the company has a fair prospect of hereafter sellingor leasing its first colliery, if thought advisable, or of making an arrangement simila to some that have already been made in the vicinity, so as to repay its original capital, and to leave a balance sufficient to establish new collieries on one or more of the remaining portions of the company's coal field, which will be all the more advantageous as no further cost will be incurred for purchase.

In the meantime the dividend set forth in the engineer's reports may safely be anticipated, inasmuch as the calculations were made in April, 1854, and before the great rise in the price of coals.

The committee feel themselves warrated in holding forth this undertaking as one calculated to produce great advantage. Therefore they will only allot shares to parties of known respectability, and who pay the amount of £2 per share on application.

The statutes and agreements under which the company will act, and the detailed plans and reports, may be seen on appcation at the offices in London.

Application for shares may be made in the annexed form, addressed to the brokers, Messrs. Bragg and Stockdale, 6, Throgmorton-street, London; or to the secretary of the Rhurort Mining Company at the offes, 31, Threadneedle-street, London; but no application will be entertained unless a deposit of £2 for each share applied for be made with Messrs. Glyn, Mills, and Co, the bankers of the company. This deposit will be returned in the event of the application not being acceded to, and if an allotment be made, it will be applied towards the payment of the £6 per share.

APPLICATION FOR SHARES.

To be addressed in the subjoined form to the secretary, at the offices of the company, or at the brokers, Messrs. Bragg and Stockdale, 6, Throgmorton-street, London.

SIR,—I request the Committee of the Ruhrort Coal Mining Company to allot me shares of £6 each; and I hereby agree to accept the same, or any less number which may be allotted to me, and to pay the remaining £4 per share on allotment; and in the event of my failure herein, hereby agree to forfeit the deposit now made with the bankers of the company, and authorise you to cancel the allotment.

Name .....
Address .....
Date .....

## THE GARDETTE MINING COMPANY.

DEPARTMENT OF ISERE, FRANCE.

This undertaking is divided into 10,000 shares, of £5 each; a deposit of £1 per share is to be paid at the time of subscribing It is hoped this sum will be enough to bring the mine into a largely productive and profitable state; in which event the remainder of the subscribed capital, in the control of the directors, will be applied to the purchase of adjoining or other properties, to be worked in conjunction with this. Failure in payment of any instalment at the time appointed to be absolute forfeiture of all previous payments, and every right to share in the property of the company.

The company is to be under the immediate control of a Board of Directors, to consist of not less than three, nor more than five members, assisted by such officers as the board shall deem necessary. A deputation of inspection are proceeding forthwith to the mines, where they will be met and aided by the advice and assistance of experienced engineers, well acquainted with the stratification and matrix of the veins of the French Alps. Upon the return of the deputation an ample report will be prepared, and a board of directors elected from the then proprietors of shares; and immediately after their election the board will proceed to the appointment of all proper officers of the company; and two shareholders' auditors will be chosen at each annual general meeting of the proprietors.

Applications for the remaining shares may be made to Messrs. KIRKMAN and Co., 4, Coleman-street-buildings, Moorgate-street, London.

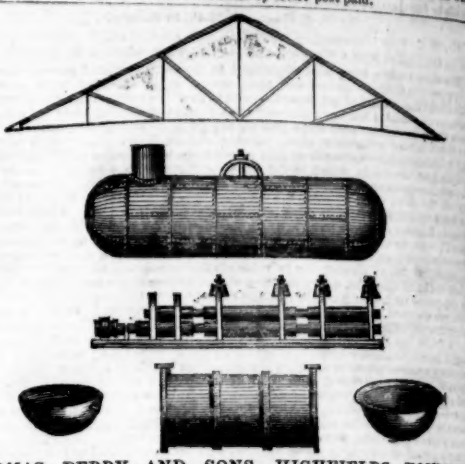
TO MARINE ENGINEERS, SCREW SHIP COMPANIES, AND MACHINISTS GENERALLY.

## THE NEW PATENT MULTIPLE ROTATIVE GEARING.

This justly admired invention contrasts with the ordinary toothed gearing, for which it is proposed as a substitute, and possesses the pre-eminent advantages of COMPACTNESS, STRENGTH, DURABILITY, FREEDOM FROM NOISE and BACKLASH, UNIFORMITY and SMOOTHNESS of ACTION, REDUCED FRICTION, FACILITY for LUBRICATION and REPAIR, and virtually WITHOUT RISK of ACCIDENT, advantages unequalled in any other arrangement of gearing. It is proposed for all purposes where a change of speed is required, and is peculiarly applicable for screw propulsion.

The proprietors of the patent are prepared to GRANT DISTRICT and OTHER LICENSES for the manufacture of this gearing, or to ENTER INTO CONTRACTS for the adaptation of the invention to screw steam-vessels, or other machinery, upon application to their agent, No. 3, Hanover Chambers, Buckingham-street, Adelphi, where any further particulars may be obtained, and models and testimonials inspected.

The invention was honourably mentioned by the International Jury at the French Exhibition of 1855; and has been favourably noticed in the *Artizan* of June and July, 1855, and the *Mining Journal* of 8th December, 1855. Manufacturers treated with on the most liberal terms. Communications by letter post paid.



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Lifting Jacks,

Is respectfully requested to the superiority of those annexed, over those hitherto in use.

ADAPTED ONLY FOR PUMPING.

DONKEY ENGINES, DONKEY ENGINES, DONKEY ENGINES—R. and J. COUPE have in STOCK a number of their IMPROVED DONKEY ENGINES, which are so suitable to the requirements of mill owners and colliery masters, sailing and steamship proprietors, bleachers and printers, farmers, &c., for feeding boilers, as a fire engine, for slacking coke, for throwing large quantities of water for miscellaneous purposes, and for the irrigation of gardens, farms, &c.

For the satisfaction of parties requiring, R. and J. COUPE have fitted up one of these engines at their works (as below), which can be started throwing water at any hour of the day, and to which they respectfully call attention. Diameter of steam cylinder 4½ in., diameter of pump 3 in., delivering 3000 gallons per hour.—Drawings sent free by post on application to R. and J. COUPE, Clayton Foundry, Wigan.

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